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NICARAGUAN ORCHID STUDIES — I

A. H. Heller and Alex D. Hawkes *

The present series of articles will deal with new or otherwise noteworthy orchids of Nicaragua. This is the largest of the Central American countries, and it has until very recent times been essentially unknown botanically. Even today the casual collector comes up with important additions to the indigenous flora with truly remarkable frequency, in virtually all groups of plants.

The senior author has resided in Nicaragua for some ten years. During this period, on several occasions with the junior author, he has visited many parts of the republic, paying especial attention to the Orchidaceae. The plants have been transported to the Jardin Heller, at Quinta Monte Fresco, near Managua, where they are cultivated under glass, in lath-houses, or on trees or special tables outdoors. Studies of specimens blooming, season after season, under these admirable conditions offer materials infinitely superior to those to be encountered in the desiccated or pickled contents of the herbarium. Detailed drawings, color photographs, and critical descriptions are made of each plant which flowers.

When this study of the Nicaraguan Orchidaceae was commenced about 1956, a total of 139 species and varieties were recorded from the country. Now, in September 1966, the total of authenticated indigenous representatives of the family stands at 543, and it is increasingly added to as our work progresses.

The reader is referred to the series of articles by Hawkes, "An Orchid Collecting Trip to Nicaragua," published in The Orchid Weekly, Volumes 1 and 2, 1959, and reprinted in a revised form in The Orchid Review, Volumes 72 and 73, 1964 - 1965, for pertinent locality data and general information on the floristics of the land.

In this series, the genera and infra-generic taxa are considered in alphabetical sequence.

EPIDENDRUM L.

The total number of representatives of the huge aggregation generally considered to comprise the genus Epidendrum L. which occur in Nicaragua is still uncertain. This since many of the collections

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by the writers have obviously been sadly mis-identified by the orchidological "experts" to whom they have been submitted are undergoing further critical study. The precise confines of Epidendrum L., sensu lato, are also being taken up by us, and by several of our colleagues, at this time.

Until we have our decisions fully formulated, the following singularly spectacular "true" Epidendrum has been found and requires establishment as a new species.

EPIDENDRUM HAWKESII A. H. Heller, sp. nov.

Planta ordine epiphytica, erecta, basin radicante (non supra). Foliis magnis, rigidis. Racemis erectis, longe-pedunculatis, usque ad 60-floris. Floris in sectione speciosis. Labellum valde 3-lobis, margine dentatis serratisque, lobum medium cuneato-flabellato, fortiter retuso; callis 2, alatis, ad apicem convergentes, medio lamellum erectum sigmoideum ornatum.

Plant normally epiphytic, but taking root on sharp overcut grassy slopes as a stilt-rooted plant with other customary epiphytes. Stems crowded or borne from the rhizome at some slight distance from one another, simple, rigidly erect, with profuse basal (no lateral) white, rarely branching roots; stems to 1 m tall, up to 6 mm in diam., below concealed by sheaths which are usually densely mottled or flushed with dark dull purple, slightly fractiflex in leaf-bearing upper portion. Leaves 3.75 - 11 cm long, 4 - 4.5 cm broad, obovate to oblong-elliptic, rather concave, with rounded slightly retuse apex, heavily fleshy-coriaceous and rigid, more or less mottled and spotted with dull purple on both surfaces, especially the underside. Inflorescence a very compact, densely-flowered raceme 2 - 3 cm long, on a peduncle up to 50 cm long, 20 - 60-flowered, the peduncle dull vinous-purple, mostly covered by scarious sheaths; rachis 4 - 6 cm long; a secondary branch customarily appears on each inflorescence the second season, this with an enlarged base, branching off from base of the original rachis. Floral bracts triangular-ovate, 4 mm long. Pedicellate ovary erect, lightly arcuate, dull vermilion, 4 - 5 cm long. Flowers very showy, 3 cm long, 2.5 cm broad, spreading, long-lived, vivid carmine lake with dark yellow calli on lip, the column-apex also yellow, the anther-cap apple-green. Sepals and petals rather rigidly heavy-textured, acute, nervose with raised nerves, those of the sepals 5; dorsal oblanceolate, 1.5 cm long, 4. 5 mm broad, reflexed above middle; laterals oblique, narrowed basally, unevenly spatulate, being expanded or lobulate on inside margin, 1.6 cm long X 4 mm broad. Petals 7-nerved, obovate, acute, the margins above middle lightly toothed, 1.5 cm long X 5.5 mm broad above middle, ascending. Lip adnate to apex of column, deeply 3-lobed, basally truncate, 8 mm long X 1.2 cm broad, the margins irregularly but shortly toothed or serrated; midlobe separated from lateral lobes by a short 3 mm broad isthmus, cuneate-flabellate, deeply re-

tuse to form a bilobed segment with an apicule in the sinus, 4 mm long X 6 mm broad. Disc with 2 prominent flap-like calli at base whose apices converge; a prominent erect sigmoid keel extends from base to apex of lip. Column almost straight, with conspicuous flaring angles especially towards apex, clavate, 1 cm long. Capsule long-stalked, to 4 cm long and 1.5 cm thick, with 3 prominent blunt keels, when mature heavily flushed with dark dull vinous-purple.

NICARAGUA: Dept. Zelaya: Rama (Roosevelt) Highway, beyond Río Mico bridge, frequent stilt-rooted orchid on moist grassy roadside bank, alt. about 400 - 600 feet, 30 March 1966, A. H. Heller & A. D. Hawkes 8344 (Type in Field Museum of Natural History).

Epidendrum Hawkesii is an ally of the widespread E. ibaguense HBK, but differs from that species, which habitually occurs at far higher elevations, in a number of vital respects. Erect-growing, rigidly so, it bears roots only basally, not scattered up the viney stems of the ally, which are in our area sprawling or even clambering into adjacent umbrage. The leaves of the novelty are of divergent shape, heavier texture, and larger dimensions. And floral dimensions, color, and shape are conspicuously different. Details of all parts of the flowers— which are extremely numerous per inflorescence (up to 60), and particularly the lip with its complex callosities, and the column, are important.

In the wild, this splendid orchid was first found as a solitary specimen some years ago by the senior author; this occurred as a true epiphyte, but regrettably no materials were preserved, except for a sketch. The habitat from which the present type materials were gathered is an exceptionally interesting one, in that the highway cuts through hillsides at a somewhat higher elevation than the epiphytic specimens have as yet been located. Yet these type plants, which within certain restricted regions are very abundant and spectacular when in flower (they would otherwise pass unnoticed), can be considered as almost epiphytic, since they are found perched loosely on intricate stilt-root systems on leafy humus on sheer hillsides along with such other normal epiphytes as a hand-some form of Gongora maculata Ldl., Ionopsis utricularioides (Sw.) Ldl., and Polystachya cerea Ldl. Additional orchidaceous neighbors are large clumps of Sobralia fragrans Ldl. and an as yet unidentified member of that genus. In this region the original forests in which these Epidendrums doubtless occurred as epiphytes were cut over about the year 1960. It would appear that the new species has admirably made a necessary adaptation to a radical change of environment.

One additional specimen of the novelty, growing epiphytically on a bare twisted Bauhinia liana in a hot, humid, palm-aroid jungle near La Esperanza (Río Siquía) was collected in March, 1966, but

did not survive. And several plants from the Río San Juan, near San Carlos, were found by H. F. Cross, of Managua, who presently has them in his extensive greenhouses there.

Epidendrum Hawkesii has been introduced into cultivation into the United States, through seed. The new species is named to honor the junior author of these studies, and of the recent Encyclopaedia of Cultivated Orchids (Faber, London, December 1965).

HELLERIELLA A. D. Hawkes, gen. nov.

Among the most exciting of our discoveries in the Nicaraguan orchid flora to date has been a large epiphytic plant which obviously represents a genus new to science.

HELLERIELLA A. D. Hawkes, gen. nov.

Planta epiphytica magna conspicue ramosa. Inflorescentiis racemosis lateralibus terminalibusque. Floris in subtribo majusculis, patentibus. Sepalis petalisquam valde amplioris. Pes columnae valde prominens. Pollinia 4.

This new genus is a member of the subtribe Ponerinae. It is closest in its affinity to Platyglottis L. O. Wms., apparently endemic to Panama. Helleriella, however, differs in its conspicuous branching habit, lateral as well as terminal inflorescences, larger spreading flowers of different shape with sepals much broader than the petals, a prominent column-foot, and four pollinia instead of six. The species described below is the sole member of the genus known to date.

HELLERIELLA NICARAGUENSIS A. D. Hawkes, sp. nov.

Large epiphytic plant, to 3 m long (averaging about 1 m long), the new growth leafy and erect, the old growths branched and pendent, leafy only on upper parts of main stem and branches. Roots flexuose, fleshy, to 15 cm long and 5 mm in diam. Rhizome woody, stout, black, up to 8 mm in diam., with stems arising at intervals of 1 - 2 cm. Stems to 3 m long, terete below, compressed above, to 1 cm in diam., woody and bamboo-like, with pithy center, gradually deciduous from the base after the first year's growth, when branches up to 30 cm long appear, with adventitious roots at the nodes; base of branches often very slender (1 - 2 mm diam.), increasing in diam. upwards. Stems and branches concealed by stiff, striated leaf-sheaths averaging 2 cm long; lower parts of stems when exposed often turning black or red-brown. Leaves ligulate, chartaceous, articulated with leaf-sheaths, the margins recurved, the basal margins somewhat crenulate, sharply carinate, the apex obliquely retuse, those of the new growth up to 13 cm long and 4 cm

broad, those of the branches up to 8 cm long and 1.6 cm broad. Inflorescences terminal on new growth and secondary branches, and lateral on old leafless stems and branches; peduncle stout, very abbreviated, occasionally up to 5 mm long, with a number of dry scarious bracts at base; rachis flexuose, up to 1.5 cm in length, with up to 6 successive flowers borne about 2.5 mm apart. Flowers rather large for the subtribe, up to 3.5 cm in diam., spreading, lasting about one week, the sepals and petals greenish to yellowish-white, often with either red or green nervation, the lip with 5 red median nerves. Floral bracts ovate, closely appressed, purplish, up to 3 mm long. Pedicellate ovary up to 1.3 cm long, arcuate, usually purple-striate. Sepals stiff, 5-nerved, with an acute fleshy apex, the basal part a bit fleshy, verruculose outside, the dorsal one 2.1 cm long and 6 mm broad near base, the apex slightly reflexed, the upper half shallowly concave, the lower portion convex; lateral sepals oblique, 2.2 cm long and 7 mm broad at base, slightly concave, dorsally carinate, subacuminate, forming a prominent mentum with the column-foot. Petals concave, 5-nerved, the median nerve sulcate on rear, ovate-lanceolate, acuminate, 1.8 cm long and 4 mm broad below middle, narrowed to an abbreviated 2 mm broad basal claw. Lip freely mobile, subpandurate, the basal 1/3 fleshy and at right angles to rest of segments in natural position, very shortly clawed, 1.8 cm long and 9 mm broad above middle, 5 mm broad at constriction, and 6 mm broad below that, the margins of upper half finely serrate or vaguely erose, the apex sharply apiculate; disc with a prominent rib extending from base to apex, where it terminates in an apicule, with 3 shorter elevated costae arising on each side of median rib. Column slender, arcuate, 9 mm long, with a prominent foot 4 mm long, apically with short lateral teeth and a tridentate tooth at the rear; anther quadrilocular, with 2 pairs of equal, compressed, triangular, waxy pollinia, each pair with reflexed farinaceous broad stipe as long as pollinia.

NICARAGUA: Dept. Jinotega: Near Jinotega Rock Quarry, epiphytic on scattered trees in and around pasture, alt. about 4700 feet, December 1959, A. H. Heller & A. D. Hawkes 1270 (Type in Field Museum of Natural History). Same locality, June 1960, A. H. Heller 2684.

Helleriella nicaraguensis has been found to date in only one locality in Nicaragua, in the vicinity of the Jinotega Rock Quarry, between Matagalpa and Jinotega. Here it is reasonably frequent, and occurs with an extraordinary wealth of other orchidaceous plants, many of them notable rarities. Its seemingly restricted dissemination is perhaps explained by the remarkable scarcity of production of seed-capsules. Careful self-pollination of living specimens at Monte Fresco has thus far failed to set these fruits.

The junior author accompanied Heller when this unusual and attractive orchid was first discovered, and it is a distinct personal pleasure to commemorate this active orchidologist's labors, once again, this time in his glorious adopted land.

LEPANTHES Sw.

Of 66 species of this highly technical genus recorded from Mexico and Central America, only one had been authenticated from Nicaragua prior to the commencement of this study of the indigenous orchid flora. To date, we have found twelve species of Lepanthes in our area, including the following charming epiphyte here established as new to science.

Additional botanical exploration of Nicaragua will doubtless increase the number of these pleurothallids here, since there are 35 species in Costa Rica and 4 in Honduras which have not as yet been detected within our territory of consideration.

LEPANTHES HELLERI A. D. Hawkes, sp. nov.

Planta epiphytica, parva, gracilis. Foliis orbicularis, fortiter concavis vel tubulari-cucullatis, margine saepe tangentibus. Floris usque ad 40 succedaneis, minutis. Petalis verrucosis, papillosis. Labellum forcipatum, lobo medio lineato, elongato, ad apicem tuberculatis ciliatis erectis ornato.

Plant erect, caespitose, 3 - 7 cm tall, the secondary stems very slender, concealed by 4 - 7 tubular, black, somewhat dilated, acuminate sheaths with reflexed margins and verrucose longitudinal costae. Leaves orbicular, sometimes broader than long, the largest about 2.1 cm long and 2.2 cm broad, always deeply concave and tubular-cucullate, with margins often touching, green to yellow-green in color, conspicuously marginate, abruptly contracted to a petiole 3 mm long, the apex rounded and minutely retuse, occasionally with an indistinct apicule in the sinus. Inflorescences 1 - 3 per growth, usually shorter than the leaves, about 2 cm long, bearing up to 40 successive flowers on each distichous raceme. Floral bracts 1 mm long, ovate, acuminate, verrucose. Flowers spreading, about 5 mm long, the sepals light greenish-yellow, the lateral lobes of the lip and posterior lobes of the petals ochraceous bordered with magenta, the anterior lobes of the petals ochraceous, remainder of lip and column magenta. Pedicellate ovary filiform, 1.5 mm long, the pedicel persistent. Sepals elliptic-lanceolate, acute, 1-nerved, the dorsal 2 mm broad at middle, the laterals united to about the middle, 1.5 mm broad. Petals transversely bilobed, with a minute apicule in the sinus, the surface and margins minutely but densely papillose, the anterior lobe triangular, subacute, small, 1.1 mm long and 0.5 - 0.6 mm broad, the posterior lobe broadly

oblong with obliquely obtuse apex, 1.5 - 1.8 mm long and 0.7 - 0.9 mm broad. Lip forcipate, bilobed, about 1 mm long, with fleshy verrucose falcate-lanceolate lateral lobes, the apices of which converge around the column-apex, the midlobe a linear elongated projection with erect tubercular ciliations near tip. Column slender, clavate, arcuate, verruculose especially towards base, 1.5 - 2 mm long; anther large, ovoid, with 2 linear pollinia.

NICARAGUA: Dept. Jinotega: Jinotega Rock Quarry, epiphyte on dry branchlets of small trees, common where found, alt. 4700 feet, August 1964, A. H. Heller 5163 (Type in Field Museum of Natural History). Cerro Volcán Grande, alt. 4000 feet, A. H. Heller 1370. Finca Santa Fé, alt. 3200 feet, A. H. Heller 4529. Dept. Matagalpa: Finca El Roblar, alt. 2650 feet, A. H. Heller 4023. Depts. Matagalpa & Jinotega: Between Cerro Matapalo (Tuma Grade) and Jinotega Rock Quarry, alt. 3200 - 4700 feet, A. H. Heller (& A. D. Hawkes, in part) 1080, 1088, 2539, 2893, 3023, 3078, 3166, 3241, 3695.

This fascinating Lepanthes, with its jewel-like flowers borne inside the cup-like leaves, is somewhat allied to L. rotundifolia L. O. Wms. of Panama, differing in the foliage, the not malleoliform lip which has a linear midlobe, and in the verrucose and papillose petals, lip, and column. Lepanthes turialvae Rchb. f., from Guatemala, Honduras, Nicaragua (new record!), and Costa Rica, differs from L. Helleri in elliptic, flattened leaves, an almost obsolete midlobe of the lip, ciliate margins of the lip's lateral lobes, and the apex of the anterior lobes of the petals, which is abruptly contracted to a falcate, subacute tip.

In the wild, Lepanthes Helleri, which though apparently rather restricted in its dissemination, is on occasion locally common, grows variously on low scrubby primarily leguminous trees (especially Acacia spp.) with Masdevallia chontalensis Rchb. f. or on guavas (Psidium Guajava L.) with Oncidium crista-galli Rchb. f. Both in the wild and in cultivation, this elfin new Lepanthes is essentially ever-blooming.

PLEUROTHALLIS R. Br.

As of this writing, fifty-three species of Pleurothallis R. Br. have been found in Nicaragua. Until Heller commenced his activtities in the republic, the total of recorded representatives of this fascinating and complex genus stood at seven.

Five very interesting Pleurothallis from the Nicaraguan collections are here described as new to science. A forthcoming paper in this series will discuss the records new to the regional flora.

PLEUROTHALLIS ALEXII A. H. Heller, sp. nov.

Planta epiphytica, erecta. Foliis linearo-ligulatis, coriaceis, ad apicem tridentatis. Inflorescentiis filiformibus, paulo elongatis, 2-floribus. Floris nutantibus, campanulatis. Petalis carnosissimis, concavis. Labellum ligulatum, sulcatum, ad apicem convexum, verruculosum, ad margine parce glanduloso-pilosum, supra basin auriculae parvae rotundatae ornatae.

Plant caespitose, about 5 cm tall, the rhizome creeping, bearing secondary stems at intervals of 1 - 2 mm. Secondary stems 1 - 1.5 mm long, concealed by scarious sheaths up to 1 mm long which also enclose the petiole. Leaves linear-ligulate, tridentate at apex, coriaceous, including the 1 cm long petiole to about 5 cm long, to 7 mm broad at middle. Inflorescence horizontal for half its length, then obliquely erect, the peduncle reddish-green, filiform, 6 - 8 cm long, with three nodes on basal third each with a 4 mm appressed sheath, with a fourth somewhat inflated sheath 5 mm long at middle. Flowers two, borne successively, large for the plant, about 1.5 cm long, nodding, the apical half of sepals dark wine-purple, the lower half striped with white; petals dark wine-purple; lip yellowish with red calli and an ochre apex; column ochraceous, with the anterior margin and foot reddish, the anther-cap white. Pedicellate ovary filiform, arcuate, verruculose above, maroon in color, 8 mm long. Sepals connate at base, 3-nerved, the exterior sparsely verrucose, the dorsal one ovate-lanceolate, shortly acuminate, 1.3 cm long and 3.8 mm broad near base, concave there, otherwise convex, the midnerve strongly carinate, the lateral nerves slightly carinate; lateral sepals connate to 3 mm from apex, 1.5 cm long and 7 mm broad when expanded, the midnerve ancipitously carinate. Petals very fleshy, concave, the surface sparsely glandular, 3.5 mm long and 2 mm broad above the middle, obliquely expanded upwards on anterior margin, the apex subacute. Lip ligulate, sulcate, 4 mm long and 1.8 mm broad above middle, the apical part convex, the apex broadly rounded and broadly retuse, with an erose apicule on the underside; a rounded auricle is set on each side of the narrowed portion about one-third from base; entire surface finely verruculose, the margins sparsely glandular-pilose; calli paired, small, basal, pilose. Column conspicuously clavate, broadly winged, 3 mm long, with a 2 mm long foot, elevated at base of foot and glandular on sides, the apex with three teeth, the posterior one broad and denticulate, the lateral ones acuminate.

NICARAGUA: Dept. Matagalpa: Cerro Matapalo (Tuma Grade), epiphytic, alt. about 3200 feet, July 1965, A. H. Heller 8631 (Type in Field Museum of Natural History).

A pickled specimen is on deposit at the Oakes Ames Orchid Herbarium of Harvard University.

Pleurothallis Alexii appears to have no particularly close allies in the Central American flora. It can be compared with the widespread P. Brighamii S. Wats., but differs in its drooping campanulate flowers, the very fleshy concave petals, and the structure of the lip. It is named to honor the junior author of this series of studies.

PLEUROTHALLIS CARNOSILABIA Heller & Hawkes, sp. nov.

Planta caespitosa, variabilis, caulis secondariis gracilis, vaginae striatae, inflatae ornatis. Floribus fere duobus. Labellum late ligulatum, carnosum, longitudine cavae duae papillosae ornatae, ad basin lobis parvis tenuis porrectis dolabriformis ornatis.

Plant caespitose, variable in size, in bloom from 2.5 to 12 cm tall, the secondary stems slender, 7 mm - 4 cm long, concealed by two scarious, striated, somewhat inflated sheaths. Leaves coriaceous, elliptic to oblong-elliptic, coriaceous, 2 - 7.5 cm long including the 5 mm long petiole, 1.2 cm broad at middle, the apex tridentate, with the middle tooth the longest. Inflorescence from base of petiole, arising from a sheath 2 - 3 mm long, lax, up to 2 cm long, spreading, usually 2-flowered, the peduncle flexuose, filiform; old peduncles frequently persist. Floral bracts 3 mm long, white, tubular, with an inflated apex, connate from above middle to base, with an apicule at the triangular apex. Pedicellate ovary arcuate, 5 - 6 mm long, reddish. Flowers about 1.5 cm long, the sepals magenta, white at base; petals green with vivid maroon nerves; lip white, with basal part of callus brownish-red, with three short red carinate nerves on underside; column maroon. Sepals 8 mm long, the dorsal joined to laterals above base, elliptic-lanceolate, subacute, concave, 4 mm broad at middle, with three carinate nerves on back, sparsely verrucose between these; laterals connate almost to the fleshy acute recurved apex, 6 mm broad when expanded, 4-nerved, the nerves carinate, broadly ovate-elliptic. Petals somewhat oblique and narrowed toward base, 4.5 mm long and 2.1 mm broad, spreading, sub-spatulate to obelliptic, with three prominent raised papillose veins on inner surface, the one on anterior margin raised as an erect lobule above the middle, the surface verrucose between the nerves, the apex rounded, cucullate and muricate. Lip 6.5 mm long and 3.5 mm broad above the middle, the lamina broadly liglulate, entire surface except apex scurfy, the apex smooth, rounded, sub-bulbose; unusual longitudinal papillose excavations occur on each side of median callus in upper half of lip; the base of the lip bears two thin porrect dolabriform lobes 2 mm long; disc with a verruculose raised callus above base of claw, 1 mm broad near base and near

apex, extending down center of lip to within 1 mm of tip about, narrowed in middle where it is strongly pilose-verrucose; thick margins of the lip curve inwards to mask some of the excavations. Column 2.5 mm long, with a foot 1 mm long, narrowing upward to a triangular, acute, denticulate apex, the stigmatic cavity large, orbicular, medial; anther erect, vaguely sigmoid and narrow in lateral view, with denticulate apex; pollinia 2, linear, white, erect and parallel to column in natural position.

NICARAGUA: Dept. Chontales: Cerro Pistacho, Babilonia district, epiphytic on large mossy tree, alt. 2150 feet, May 1962 (flowering June and July), A. H. Heller 6537 (Type in Oakes Ames Orchid Herbarium of Harvard University).

There are apparently no Central American species of Pleurothallis even remotely related to P. carnosilabia. The closest ally would seem to be the Colombian P. triquetra Schltr., in that the lip has somewhat similar longitudinal excavations, but the present taxon differs widely in other respects. The basal part of the lip is much like that of P. pteroglossa Schltr., also from Colombia.

The specific epithet is given in allusion to the extremely fleshy labellum.

PLEUROTHALLIS CHONTALENSIS Heller & Hawkes, sp. nov.

Planta parva, caespitosa. Foliis erectis, obovatis, tridentatis. Pedicellis glandulo-pubescentibus, alae ancipitae prominentibus ornatae. Labellum oblongo-ligulatum, ad apicem rotundatum obtusumque, ad basin lobulis eerectis parvis denticulatis ornatis.

Plant caespitose, small, to 6 cm tall, the roots slender, flexuose, white, to 2 cm long, the secondary stems 5 - 7 mm long, concealed by white scarious sheaths. Leaves subcoriaceous, erect, obovate, tridentate but not oblique at apex, 3 - 4.5 cm long including the 5 - 10 mm long petiole, 0.8 - 1.3 cm broad above middle. Inflorescence solitary from base of petiole, erect, the peduncle filiform, to 4 cm long, glandular, with small basal sheath, usually bearing a single flower (this with lateral sepals uppermost in most instances) with an abortive attendant bud; on occasion old inflorescences indicate as many as five successive flowers. Floral bracts tubular, acute, glandular-pubescent, 2 mm long. Flowers not opening fully, about 1.5 cm long, ochraceous greenish-yellow, the petals and lip-callus orange. Pedicellate ovary glandular-pubescent, the ovary triangular with 3 high ancipitous wings and a lower one between each, the ovary 3 mm long, borne at right angles to persistent 1 cm long pedicel. Sepals ovate-lanceolate, acute, 1 cm long, 3-nerved, the surface somewhat glandular, the margins ciliate, the keeled nerves ciliate, the median one of the dorsal sepal ancipitous, prominent, this segment 3 mm broad below middle, its inner surface with

conspicuous bullate or ocellate spots; lateral sepals joined to within about 2 mm from apex, 4 mm broad above middle. Petals thin-textured, spatulate, with wide lobe on anterior margin, the apex falcately acute, narrowed basally, 2-nerved, 3 mm long and 1.1 mm broad above middle. Lip parallel to column, oblong-ligulate, with a rounded obtuse apex, broadest at base, 3.5 mm long and 1 mm broad near apex, fleshy, verruculose, sulcate, the apex more fleshy, margins ciliate, with an erect lobule on each side 1 mm from base; callus elevated, bifid, papillose, extending from lip-base to lateral lobules. Column slender, clavate, winged, 2.5 mm long, apically with 2 acuminate lateral teeth and a broad denticulate posterior one, the broadly elliptic, alate foot 1.2 mm long, at right angles to column; anther helmet-shaped, apiculate.

NICARAGUA: Dept. Chontales: Rio Mico, epiphytic, alt. 1500 feet, August 1960, A. H. Heller 3735 (Type in Oakes Ames Orchid Herbarium of Harvard University). Same locality, alt. 1400 feet, in bloom December, A. H. Heller 3575. Same locality, alt. 1400 feet, in bloom May and June, A. H. Heller 7827. Cerro El Chamarro, La Libertad district, epiphytic, alt. 2175 feet, June, A. H. Heller 1036.

Pleurothallis chontalensis belongs to the P. glandulosa Ames alliance, this including P. barbae Schltr., P. fulgens Rchb.f., P. glandulosa Ames, P. pertenuis C. Schweinf., and P. vitariifolia Schltr. Its closest ally appears to be the Costa Rican P. barbae Schltr., from which it differs in the following respects: broad, not linear leaves; although the pedicel is glandular-pubescent, the ovary is only sparsely so, and has very prominent ancipitous wings; the floral bracts are densely glandular and acute, not apiculate; the inner surface of the dorsal sepal has bullate or ocellate spots of some prominence, these not noted in P. barbae; the lip is of divergent shape, and the two lateral lobules are very small and denticulate; the column-foot lies at right angles to the column, is broadly suborbicular, separated from the column by a constriction or isthmus, and is deeply excavated with wing-like margins; and the lateral teeth at the apex of the column are acuminate, while the broad triangular posterior one is lacerate.

This pretty novelty is named for the spectacular Nicaraguan department in which it occurs with some frequency.

PLEUROTHALLIS EXESILABIA Heller & Hawkes, sp.nov.

Planta caespitosa, parva. Foliis crassis, oblanceolatis, tridentatis. Inflorescentia singula, filiformis, 3-4-floribus succedaneis producens. Labellum panduratum, exesum, inflatum, foramen in medio discum occuparum.

Plant caespitose, small, in bloom to 4 cm tall, the secondary stems almost obsolete, 3 mm long, concealed by scarious white sheaths. Leaves thickly coriaceous, 1.2 cm long, including a petiole of about 2 mm, 3.5 mm broad above the middle, oblanceolate, tridentate at the apex. Inflorescence solitary, to 4 cm in length, the peduncle filiform, reddish, bearing a solitary infundibuliform nract near middle and 3 or 4 flowers, these opening successively. Floral bracts tubular, 1 mm long. Flowers opening well, about 1 cm long, the sepals and petals pale greenish - yellow with reddish longitudinal veins, the lip reddish-brown with pale greenish-yellow basal portion, the column greenish-yellow, reddish between wings on anterior surface. Pedicels persistent, the pedicellate ovary reddish, 4 mm long. Sepals lanceolate, acute to subacuminate, with strongly serrated margins, 6 mm long, the dorsal 1.5 mm broad, with 3 carinate nerves, the laterals free almost to base, lanceolate, vaguely falcate, with 2 carinate nerves, 1.8 mm broad below the middle. Petals ovate, long-acuminate, concave, sparsely toothed above middle, 1-nerved, 3 mm long and 1 mm broad. Lip pandurate, 2.5 mm long and 0.8 mm broad, hollow and inflated, the opening at center of disc, with 2 small teeth on claw and a large and broad falcate porrect lobule on each side at base of lamina, these lobules with incurved apices; callus raised, smooth, extending from claw to middle of lip, narrowly retuse at base; above the opening at the middle of the lip there is a slight swelling, but up from there to apex the lip is concave; apex of lip rounded, bliint, with long pilose hairs on margins and underside. Column 1.9 mm long, slender, somewhat arcuate, shallowly winged, with an entire apex; anther white, ovoid, contracted to a truncate apical neck, the 2 pollinia white.

NICARAGUA: Dept. Jinotega: near Finca Santa Elena, Matagalpa - Jinotega Highway, on fallen branch with Pleurothallis fuegii Rchb.f., alt. 4510 feet, in bloom July 1962, A. H. Heller 6497 (Type in Oakes Ames Orchid Herbarium of Harvard University).

In habit, structure of the sepals and petals, as well as general shape of the lip, this remarkable novelty is reminiscent of Pleurothallis samacensis Ames, of Guatemala and Costa Rica. It differs, however, in the hollow lip, this with a small orbicular opening at the center of the disc. The apical portion of the labellum, further, bears long hairs which are lacking in P. samacensis.

The specific name is derived from the Latin, exesus, hollowed out, and labium, lip or laebellum.

PLEUROTHALLIS HELLERI A.D.Hawkes, sp.nov.

Planta pro genere multo procera, erecta. Foliis subcoriaceis, nervosis, ellipticis, ad basin apicemque contractis, mag-

nis. Inflorescentiis pluribus, flexuosis, gracilis, multifloris. Floris patentibus. Labellum carnosum, verrucosum, infra medio 3-lobatum, lobum medium oblongo-ovatum, obtusum, ad basin callis duobus elevatis mammillatis ornatum.

Plant large for the genus, to 50 cm tall, the rhizome abbreviated, stout, woody, set with scarious fibers and flexuose white roots 1 mm in diameter. Secondary stems erect, borne at intervals about 1 cm apart, terete, glabrous, to 35 cm long, 2 - 3 mm in diameter, with a striated sheath 1.5 cm long at base and another one 4 cm long near middle. Leaves obliquely spreading, subcoriaceous, nervose, elliptic, abruptly contracted to a subacuminate tridentate apex, contracted at base to a conduplicate petiole 1.5 cm long, up to 20 cm long and to 6 cm broad at middle. Inflorescences 2 to 6 straggly, flexuose racemes to 10 cm long, arising from a 4 mm keeled spathe, arching to sub-pendent, the peduncle slender, 1 - 2 cm long, the rachis bearing 10 to 20 flowers about 1 cm apart. Floral bracts triangular-ovate, inflated, 1.5 mm long. Flowers spreading, about 2 cm long when expanded, greenish-yellow with red dots on the lateral lobes of the lip and its callus. Pedicel persistent, filiform, 3.5 mm long, the ovary 2.5 mm long. Sepals lanceolate, long-acuminate, setaceous, dorsally carinate, 1 cm long, the dorsal 2.6 mm broad near ovate base, 3-nerved, the laterals connate to the narrowly truncate apex, 4-nerved. Petals narrowly linear, attenuate, setaceous, 1-nerved, 9 mm long and 0.6 mm broad at base, spreading. Lip fleshy, 2 mm long and 0.7 mm broad, slightly arcuate in natural position, verrucose, with a short membranaceous cucullate claw, 3-lobed below middle with thin, erect, rounded lateral lobes which are difficult to spread out, the midlobe oblong-ovate, obtuse; disc with an elevated mammillate callus along the base of each lateral lobe. Column short, 1.5 mm long, stout, clavate, finely papillose especially on the prominent rounded column-foot; anther subquadrate, with 2 verruculose pollinia.

NICARAGUA: Dept. Chontales: Cordillera Amerrisque, epiphyte, alt. 2700 feet, December 1962, A. H. Heller 3784 (Type in Field Museum of Natural History; isotype in Oakes Ames Orchid Herbarium of Harvard University). Río Mico, alt. 1150 feet, January 1963, A. H. Heller 7870.

As yet, this singularly attractive Pleurothallis is known only from two localities in Nicaragua's Departamento de Chontales. It may, however, be more widespread here, since its habit is superficially much like that of the common and widespread P. gelida Ldl., and its distinctiveness would not have been noticed unless specimens were encountered in bloom. Pleurothallis Helleri is distantly allied to P. ruscifolia R. Br., distributed from Cuba and Guatemala to northern South America. The inflorescences of the latter, however, are glomerate or fasciculate, with

obsolete peduncles, while in the present novelty up to twenty flowers appear on each of the multiple rather elongate racemes. Floral structure, too, of P. Helleri, particularly details of the lip, differs from all other members of the genus with which we are familiar.

The new species is named to honor the senior author of this serial, A. H. Heller, who has immeasurably increased our knowledge of the orchids of his adopted land, Nicaragua.

SOBRALIA R. & P.

Of the 35 Sobralias recorded from Mexico and Central America, only three had been authenticated from Nicaragua prior to the present study; eight species had been reported in the past, north of Costa Rica.

Thirteen representatives of Sobralia R. & P. are now known from Nicaragua, and the immense colonies of these spectacular orchids on Volcán Mombacho promise to add to this total as critical studies continue. Four new species are herewith described.

SOBRALIA CHATOENSIS Heller & Hawkes, sp.nov.

Planta epiphytica, brevis. Foliis rigidis, multi-nervosis. Floribus patentibus, speciosis. Labellum ellipticum, ad basin tubulosum, parve trilobatum, crenulatum, disco fossa depressa ornato.

Plant epiphytic, to 30 cm tall, profusely rooting. Stems leafy, with leaves spaced 3 - 4 cm apart, the leaf-sheaths spotted with red. Leaves rather stiff and rigid, to 16 cm long and 5 cm broad, with 9 major nerves, the median one of which has a dorsal keel, on each side of which are 2 minor accessory nerves. Flowers showy, short-lived, spreading, about 10 cm across in natural expansion, the sepals and petals magenta, lighter towards base; apical margins of lip rich magenta, the throat and disc ochreous-brown, the sulcate portion holding median nerves gold-ochre, the basal calli rich yellow; column yellow on anterior face, with purplish apical teeth. Sepals 7 cm long and 2.2 cm broad, oblanceolate, acute, shortly clawed. Petals 7 cm long and 2 cm broad above middle, oblanceolate, with slender claw, obscurely crenulate on apical margins. Lip elliptic, forming a firm tube clasping the column, 7 cm long and 5 cm broad when spread out, obscurely trilobate, the apical margins crenulate; disc with a flat depressed channel 5 mm broad down the middle which encompasses 5 raised median nerves which extend somewhat beyond middle of lip; there are no tubercles between the basal calli, which measure 1.5 cm in length. Column 4.5 cm long, clavate only near the apex.

NICARAGUA: Dept. Boaco: Cerro Chato, epiphytic, alt. 2500 feet, January 1964, A. H. Heller 9553 (Type in Field Museum of Natural History).

Sobralias on Cerro Chato are very rare, and this sole collection appears amply distinct from all others known to us from Central America. The median channel on the lip is especially unique.

SOBRALIA HAWKESII A. H. Heller, sp. nov.

Planta speciosa, caulis parce maculatis, gracilis. Foliis elliptico-lanceolatis, magnis. Floribus profusis, succedaneis, speciosis. Labellum ad basin tubulosum, ad sino apicem 5 nervis brevis elevatis pustulatis ornato.

Plant epiphytic, erect to spreading, up to 15 dm tall, profusely rooting, the roots forming sizeable mounds. Stems slender, 6 - 8 mm in diameter, slightly maculate, the leaf-sheaths maculate and verrucose. Leaves elliptic-lanceolate, acuminate, 11-nerved, up to 20 cm long and 7 cm broad, light green, with prominetnt ribs. Flowers produced successively almost throughout the year, lasting rather well for the genus, to 15 cm in diameter, the sepals, petals, and apical margins of the lip rich lustrous magenta-red, basal half of throat yellow, light lilac towards lateral margins, with a brown-ochre band between the yellow of throat and magenta-red lip-apex, the lateral teeth of the column purple. Sepals 7.5 cm long, apiculate, with 9 main nerves, the dorsal oblanceolate, 2.1 cm broad, the laterals elliptic-lanceolate, 2.5 cm broad. Petals elliptic-spatulate with a short narrow claw, 7.5 cm long and 6 cm broad above the middle, the diverging nerves with an intricate network of short obliquely transverse veins, margins crenulate in upper third, the apex subtruncate with a small triangular apicule. Lip tubular basally, 7.6 cm long and 6 cm broad when spread out, cuneate-obovate, somewhat constricted on crisped-undulate margins 1.5 cm from apex to form a subquadrate, deeply retuse apical lobule; disc with two yellow calli at base which are 1.5 cm long, and 3 median raised nerves which extend from base for three-quarters of entire length of the lip; a lateral nerve is present on each side, extending to the center of the lip, and a shorter nerve branches off from the base of each of these laterals; 5 mm from the apex of the three median nerves occur five somewhat blistered radiating nerves 5 mm in length. Column 3.5 cm long, triangular in cross-section, with a thin spreading wing on each side of the anterior face.

NICARAGUA: Dept. Granada: Volcán Mombacho, frequent epiphyte on thickly mossy trees in wet shaded forest, alt. 3950 feet, January 1960, A. H. Heller & A. D. Hawkes 3025 (Type in Field Museum of Natural History). Same locality, A. H. Heller 7728.

This strikingly beautiful orchid is a frequent inhabitant of the marvelous forests of Mombacho Volcano, haunt of an extraordinary array of differentk kinds of Sobralias. In addition to the present

S. Hawkesii, at least three others appear sufficiently distinct to warrant erection as new species; these will be discussed at a later date in this serial, upon flowering of additional living materials, and the complex forms which appear to be natural hybrids betwixt these populations will as well be considered.

Sobralia Hawkesii has no immediate allies with which we are familiar. It is related, obviously, to the as yet unnamed collection A. H. Heller 9132, also from Volcán Mombacho, but the light green (not dark blackish-green) leaves are more lanceolate and less stiff, the maculations on the leaf-sheaths are much less pronounced, floral form and dimensions are radically different, and the five short, raised, blistered nerves near the sinus of the lip are as well distinctive. It is a species of considerable horticultural potential, one which flowers profusely almost throughout the year at Jardín Heller, Quinta Monte Fresco, altitude about 1800 feet.

SOBRALIA HELLERI A. D. Hawkes, sp. nov.

Planta epiphytica, speciosa, erecta. Caulis robustis, flexuosis. Foliis plus minusve in plano singulo disponentibus, rigidis, fortiter plicatis, magnis. Floribus speciosis, non patentibus, singularis. Sepalis ad basin connatis. Labellum expansum ellipticum, prope saccatum, margine prope integrum.

Plant epiphytic, tall, to more than 1 m, erect-spreading. Stems stout and stiff, somewhat flexuose, up to 6 mm in diameter, smooth olive-green with distinct red-brown maculations on the leaf-sheaths. Leaves more or less in one plane, green, plicate, fairly stiff, borne 3 - 4 cm apart, the largest ones to 23 cm long and 8 cm broad, elliptic-lanceolate, acuminate, with 9 sharply carinate nerves, sulcate above; the laminas of the leaves overlap one another to a considerable extent. Flowers borne successively and frequently over a space of several months, lasting longer than usual for this genus, about 6.5 cm long, not widely expanding due to basally connate sepals, which are pure white; petals pure white; lip on inner surface rich blood-red, outer surface white except for red median nerve; column-face red. Floral bracts several, 3 - 4 cm long, forming an inflated, lanceolate, acuminate, rigidly erect sheath-like structure to 8 cm long. Pedicellate ovary slender, decurved, 3 cm long. Sepals soft-fleshy, 7-nerved, elliptic-lanceolate, apiculate, concave, 6.5 cm long, connate for 1 - 2 cm at base, the dorsal one 2 cm broad, the laterals oblique, 2.3 cm broad. Petals 7-nerved, the three median ones close together and raised, obliquely elliptic-lanceolate, apiculate, 5.5 cm long and 2 cm broad, the median nerve sulcate underneath, the posterior apical margin recurved, serrulate. Lip 7 cm long and 4.5 cm broad, cuneate in natural psosition, broadly elliptic when spread out, deeply conical to almost saccate, apical-

ly retuse with a convex bulge in the sinus, the margins entire except for indistinct serrations on extreme apical part, nerves numerous, indistinct, radiating, none of them elevated; disc with two linear erose papillose calli 2 cm long at base, these terminating in two to three very short ancipitous teeth. Column disproportionately elongate, 4 cm in length, slender, clavellate, 8 mm broad below apex, 2.5 mm broad at base.

NICARAGUA: Dept. Rivas: Volcán Maderas, Isla de Ometepe, Lago de Nicaragua, epiphyte in mossy rain forest, alt. 4000 feet, May 1963, A. H. Heller 8029 (Type in Field Museum of Natural History).

Sobralia Helleri appears totally distinct from all other described members of the genus. In the wild plants, at least, the leaves lie distichously in very much the same plane, with one conspicuously overlapping the other; in cultivation, this condition seems to vary to some degree. Though the flowers do not expand fully, because of the basal connation of the sepals, the pure white color of the outer segments beautifully sets off the incredible hue of the lip, a startling rich blood-red which is unknown elsewhere in the Orchidaceae, at least to this writer. The labellum, with its entire, unfrilled or non-crenulate margins, possesses a bulging, concave medial portion which is very fleshy and difficult to spread apart; some 5 mm inside the margins the lamina thins in texture and furls under towards the apex. There are no raised nerves nor lamellae, except the basal elevated calli. The white underside of the lip sports a striking red median nerve.

This is, in the opinion of the junior author, one of the most exciting of Heller's Nicaraguan discoveries to date. It is an uniquely beautiful Sobralia, one which immediately attracts the attention of the viewer, and its ease of culture (at considerably lower elevations than its cloud-wreathed native habitat) and profuseness of bloom at once recommend it to the connoisseur collector who values these remarkable orchids. It is indeed to be hoped that the fascinating Sobralia Helleri will ere long be made available, to selected orchidists, outside of its isolated, volcanic, insular home.

It appears that this new species is a narrow endemic to Volcán Maderas, on the island of Ometepe in Lake Nicaragua; its twin peak, Volcán Concepción, the taller of the pair, is persistently active. As of this writing, it is the sole species of its genus which has been discovered on the island, an area which has already produced some remarkable new genera and species for the Nicaraguan flora and for science (see Heller's article, "Notes from Nicaragua: Houlletia tigrina," in Amer. Orch. Soc. Bull. 35: 213 - 214. March 1966.).

SOBRALIA TRIANDRA Heller & Hawkes, sp.nov.

Planta epiphytica, rigida, erecta. Foliis elliptico-lanceolatis, patentibus. Floribus plerumque 2, patentibus, triandris. Label-

lum 7-nervosis, callis obsoletis.

Plant epiphytic, up to 1 m tall. Stems stiff, erect, yellow-green, slightly compressed, to 5 mm in diameter, the upper part with about 7 leaves, lower part concealed by dry leaf-sheaths, these like the stem with minute brown maculations. Leaves elliptic-lanceolate, yellow-green, spreading, to 13 cm long and 5 cm broad, borne 4 - 5 cm apart, fairly stiff, subcoriaceous, the upper surface smooth, set with 9 nerves that are sulcate on the underside, abruptly and shortly acuminate with an apicule at the tip (not tridentate). Pedicellate ovary clavate, to 3 cm long. Flowers usually 2, borne successively, widely expanding, to more than 10.5 cm across, the sepals and petals white often tinged with lavender; apical part of lip blue-lavender to violet-blue, the raised nerves in the tubular throat rich yellow. Sepals linear-lanceolate, acute, the dorsal one 6.5 cm long and 1/2 cm broad, the laterals oblique, 6.2 cm long and 1.5 cm broad above the middle. Petals oblanceolate, acute, with serrated margins in upper half, 5.8 cm long and 1.8 cm broad above the middle. Lip tightly tubular, with flaring apex, 3-lobed, obovate when spread out, convolute at base, 6 cm long and 4 cm broad, the apical lobe deeply retuse and with a blunt rounded apicule in the sinus, the apical margins crenulate and erose to deeply lacerate; disc with a flat sulcate smooth callus commencing at 1 cm from the base, this giving rise to 7 slightly elevated nerves which become more elevated and pronounced to beyond the middle of the lip, where they become sinuate, crenulate, and verrucose; there are often 1 or 2 lateral, obscurely elevated nerves as accessories; basal lateral calli and fovea obsolete. Column 3 cm long, clavate, slightly alate from top to bottom, the apex with a broad forward-projecting posterior tooth; clinandrium bears a shallow, serrated lobe on each side; anthers invariably 3; sometimes the lateral anthers have four divisions and on other occasions, two.

NICARAGUA: Dept. Jinotega: Macizo de Peñas Blancas, epiphytic, alt. 2500 feet, April 1961, A. H. Heller 7260 (Type in Field Museum of Natural History). Finca Santa Fé, alt. 3200 feet, June 1960, A. H. Heller 4571. Dept. Chontales: Cerro Pistacho, alt. 2150 feet, February 1961, A. H. Heller 6879. Dept. Matagalpa: Finca La Isla, alt. 3800 feet, March, A. H. Heller 8964.

In the seven raised nerves on the lip-disc, this species is a bit reminscent of Sobralia Bouchei A. & S., of Panama. But it differs from that taxon in being consistently triandrous (apparently an unique condition in the genus), in that the raised nerves do not extend to the basal part of the lip, and in the naked disc there. Further, the flowers are of a different color, with the apical portion of the lip blue-lavender to violet-blue, a distinct-

ive hue for a Sobralia.

When the first collections of this extraordinary plant were made, the senior author of course thought that the three anthers were merely an aberration. But Sobralia triandra has now been found in widely separated localities in Nicaragua, and the trio of fertile anthers is invariably present.

The senior author also believes that the triandrous condition might have been developed for the perpetuation of the species, since seed-capsules are rarely encountered. Furthermore, the narrowness of the slender, tubular lip might not admit the larger usual pollinators for similar appearing large flowered Sobralias.

VANILLA Sw.

As of this writing, five species of the genus Vanilla Sw. have been found in Nicaragua. Vanilla planifolia Andr. and V. Pompona Schiede have previously been recorded from the area, as noted by L. O. Williams in his Enumeration published in 1956 (Ceiba, Volume 5).

Critical exploration by A. H. Heller has brought to light Vanilla Pfaviana Rchb.f., previously known from Mexico, British Honduras, Guatemala, and Costa Rica; V. odorata Presl, previously known only from Ecuador and Bolivia; and an unusual plant, new to science, which is here described in his honor.

VANILLA HELLERI A.D.Hawkes, sp.nov.

Planta scandens, elongata, caulis flexuosis, subquadratis. Foliis carnosis, oblongo-ellipticis, ad apicem abrupte acuminatis contractis. Floribus pro genere parvis, sub-patentibus. Labellum fortiter 3-lobis, lobo medio appendicis elongatis retrorsis complanatis ornato. Columna gracilis, sub-clavellata, infra stigmato pilis gracilis glandulosis ornatis.

Plant scandent, elongate, the rooting stems flexuose, subquadrate, sulcate on two sides, 1 cm in diameter, dark olive-green. Leaves 1 - 14 cm apart, fleshy, 12 - 14 cm long, 3.5 - 4.5 cm broad, oblong-elliptic, abruptly contracted to an acuminate apex 1 cm long, below abruptly contracted to a sulcate petiole 1 cm long. Inflorescence 10 cm long, with an almost obsolete peduncle, subumbellate, bearing a succession of up to 20 flowers. Flowers small for the genus, about 6 cm in diameter, semi-spreading, short-lived, the sepals whitish with underside of upper half greenish, the petals whitish, the lip bright yellow with orange appendages on the midlobe, the column white. Floral bracts triangular-ovate, dark green, 7 mm long and 4 mm broad. Pedicellate ovary slender, 5 cm long and 3 mm in diameter, white with the tip

of the ovary green. Sepals 4 cm long, slightly concave, with 7 - 9 nerves, the dorsal oblanceolate, 1.4 cm broad above the middle, the laterals 1.4 cm broad at middle, oblong-elliptic, oblique, sub-obtuse. Petals 4 cm long and 1.3 cm broad, oblong-elliptic, obtuse, set with thick 3-nerved median carinae on both surfaces. Lip strongly 3-lobed, 4 cm long and 3 cm across the lateral lobes when spread out , adnate to base of column and without a claw; midlobe densely covered with retrorse complanate elongated appendages ; lateral lobes multi-nerved, with entire margins; a penicillate crest is located in the exact center of the lip, and from this point to the base there is a slightly raised verruciform callus which becomes rather dense and more tuberculate at the base. Column slender, rather straight, sub-clavellate, with fine glandular hairs extending for a short distance just below the stigmatic orifice.

NICARAGUA: Dept. Chontales: 2 miles south of La Libertad on the road to Santo Tomás, growing as a vine on a wild avocado (Persea sp.) tree, alt. 1900 feet, April 1962, A. H. Heller 7946 (Type in Oakes Ames Orchid Herbarium of Harvard University).

This interesting, small-flowered Vanilla has no close Central American allies. The structure of the lip in particular is most distinctive.

All plates by A. H. Heller

Plate 1. Epidendrum Hawkesii A. H. Heller, sp. nov.
Left, habit of flowering plant and inflorescence, with semi-mature seed-capsule. Upper right, flower, approx. natural size. Center, seed, considerably enlarged. Center below, sepals and petal. Lower center, column and lip in cross-section. Bottom, largest leaf. Center right, lip enlarged. Lower right, anther, two views, enlarged.

Plate 2. Helleriella nicaraguensis A. D. Hawkes, gen. et sp. nov.
Left, second year growth of flowering plant. Bottom left, anther and pollinia. Center, flower, dissected. Bottom, first year growth of plant. Top right, column and foot, in cross-section. Top center, oblique face-view of column. Center right, column and lip in lateral view.

Plate 3. Lepanthes Helleri A. D. Hawkes, sp. nov.
Upper left, habit of flowering plant. Lower left, leaf expanded, with stem-apex. Center left top, flower, enlarged considerably. Center left bottom, petal and lip, lateral view. Center top, petal, enlarged. Right top, lip expanded and lip with column. Center right, pollinia and anther. Bottom right center, lateral view of lip, enlarged. Bottom right, stem with dilated costate sheath.

Plate 4. Pleurothallis Alèxii A. H. Heller, sp. nov.
Top left, flowering plant. Top center, lateral and top view of flower. Top right, dorsal and lateral sepals. Center left, base of plant, showing attachment of inflorescence. Center, column and lip. Center right, anther-cap. Bottom left, column, front face. Bottom center left, lip, top view. Bottom center right, petal, frontal view. Bottom right, petal in cross-section.

Plate 5. Pleurothallis carnosilabia Heller & Hawkes, sp. nov.
Top left, flowering plant. Bottom left, anther. Top center left, floral bract. Below this, petal. Below this, flower. Below this, lip in natural position. Center top, flower, showing sepals and lip. Center right, column in lateral cross-section. Center bottom, two sections through lip. Top right, column and lip in natural position. Petal sectioned. Column seen in lateral section and in frontal view. Section of lip, column, and lateral sepals. Underside of lip-base, showing its carinae. Center right, section through petal. Bottom right, basal lobes of lip expanded.

Plate 6. Pleurothallis chontalensis Heller & Hawkes, sp.nov. Top left, flowering plant. Center left, column in face view. Center right, lip. Right, section through dorsal sepal, plus dissection of flower, except lip. Left center, pedicellate ovary, column, and lip, in lateral view. Right center, section through lateral synsepal and this segment. Bottom left, section through pedicellate ovary. Bottom left center, pollinia and anther. Bottom right center, apex of leaf.

Plate 7. Pleurothallis exesilabia Heller & Hawkes, sp.nov. Top left, flowering plant. Top center, longitudinal section of a leaf. Right, flower, dissected. Center left, lateral view of column and lip, and lateral cross-section of lip, showing cavity. Bottom left, column with basal callus, next basal auricle, next front of column, and to right, underside of lip. Bottom center, anther-cap and pollinia.

Plate 8. Pleurothallis Helleri A.D.Hawkes, sp.nov. Left, flowering plant. Top right, flower, dissected. Lower center right, lip expanded, plus lateral view of lip and same in cross-section. Bottom right, lateral view of column, frontal view of the column, and anther-cap with pollinia below.

Plate 9. Sobralia chatoensis Heller & Hawkes, sp.nov. Left, leaf, with portion of leaf-sheath. Flower, dissected. Bottom center, section across lip-disc. Center right, lateral and frontal views of column.

Plate 10. Sobralia Hawkesii A.H.Heller, sp.nov. Dissected flower on outline of average leaf. Bottom left, lip in natural lateral position. Center right, column with apex of pedicellate ovary in lateral position, and column in frontal view. Bottom right, cross-section through column.

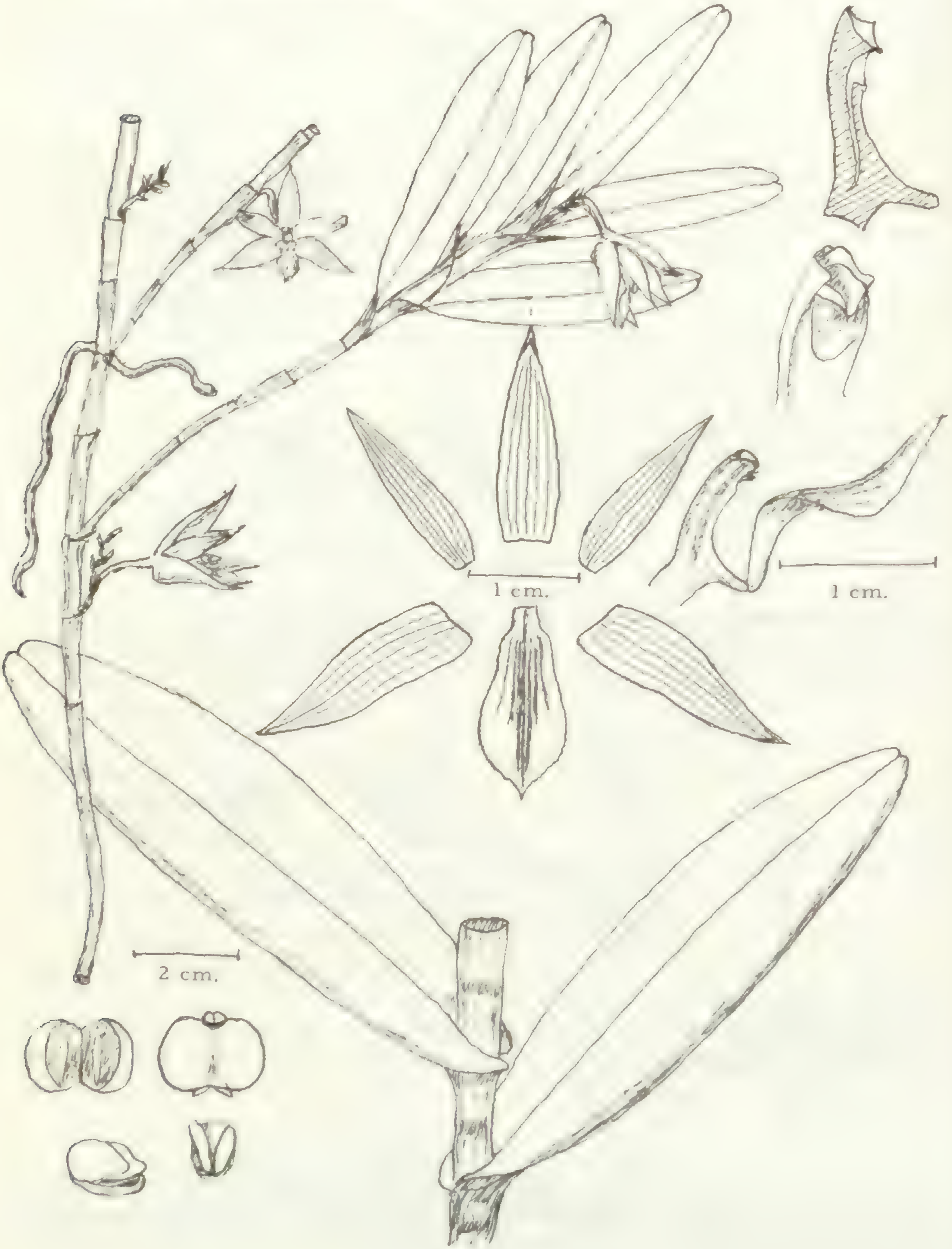
Plate 11. Sobralia Helleri A.D.Hawkes, sp.nov. Flowering plant, showing apical sheathing bract-system. Bottom left, underside of lip, and anther. Center right, lip expanded, plus sepals and petal. Bottom right, lip in lateral view, and column in lateral view.

Plate 12. Sobralia triandra Heller & Hawkes, sp.nov. Left, apex of flowering plant. Bottom left, apex of column with anthers removed. Top right, apex of triandrous column. Upper right, median anther, and to its right, one of the lateral anthers.

Plate 13. Vanilla Helleri A.D.Hawkes, sp.nov. Left, portion of leafy stem with flowering inflorescence. Center left, lateral view of column. Top center, frontal view of column. Dissection of floral parts.

Plate 1. Epidendrum Hawkesii A. H. Heller, sp. nov.

Plate 2. Helleriella nicaraguensis A. D. Hawkes, gen. et sp. nov.



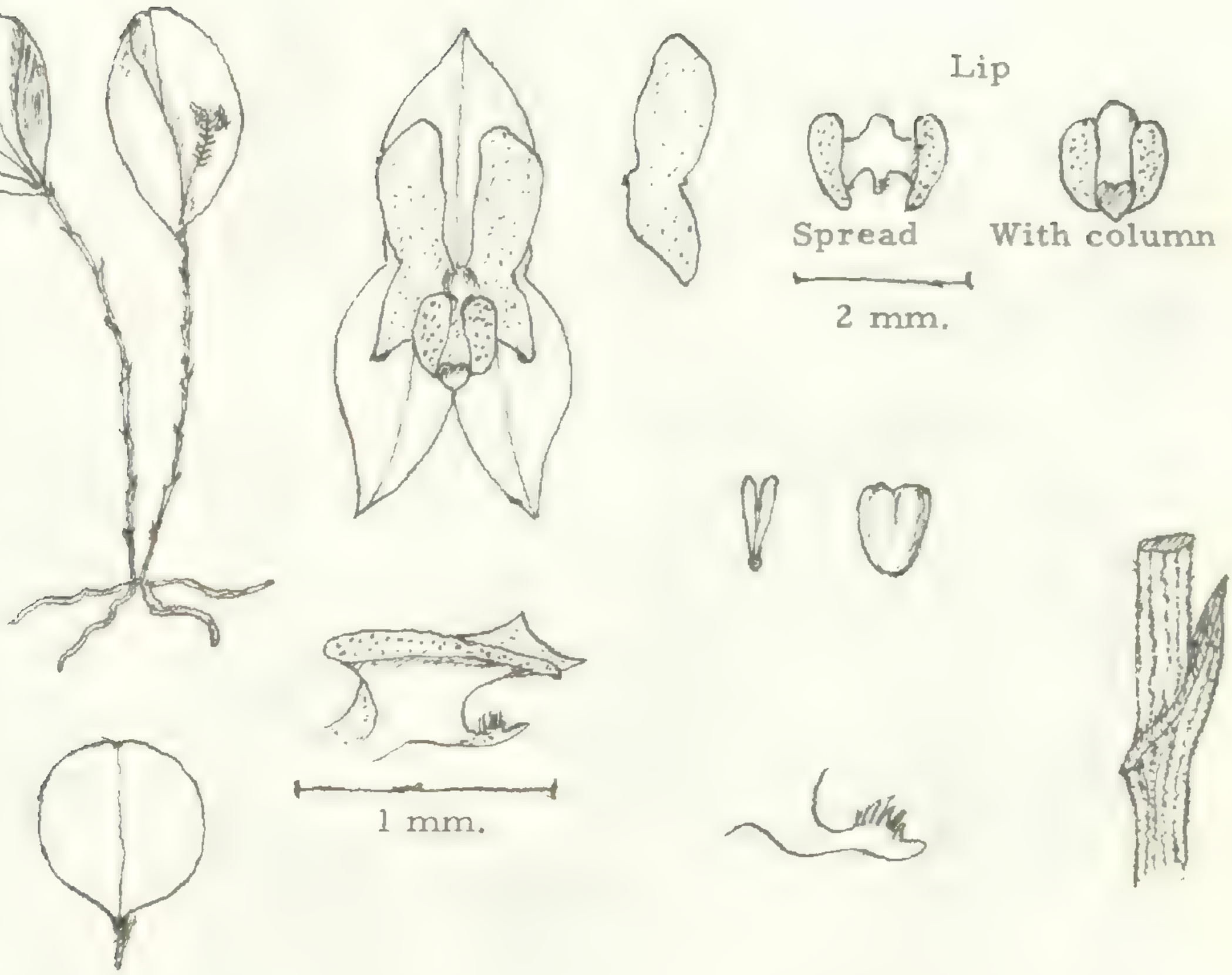
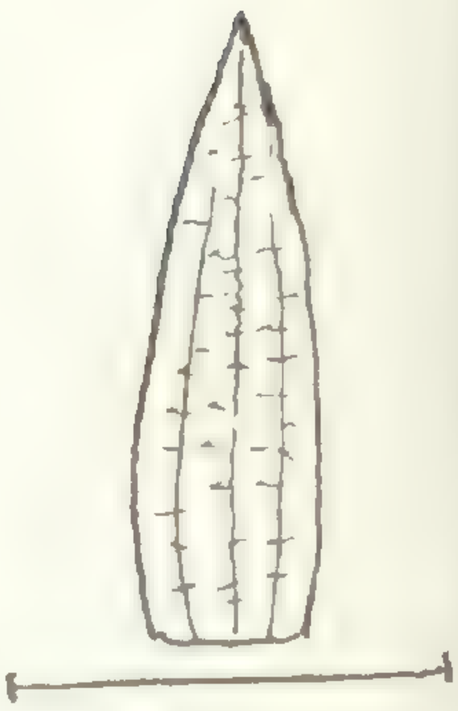


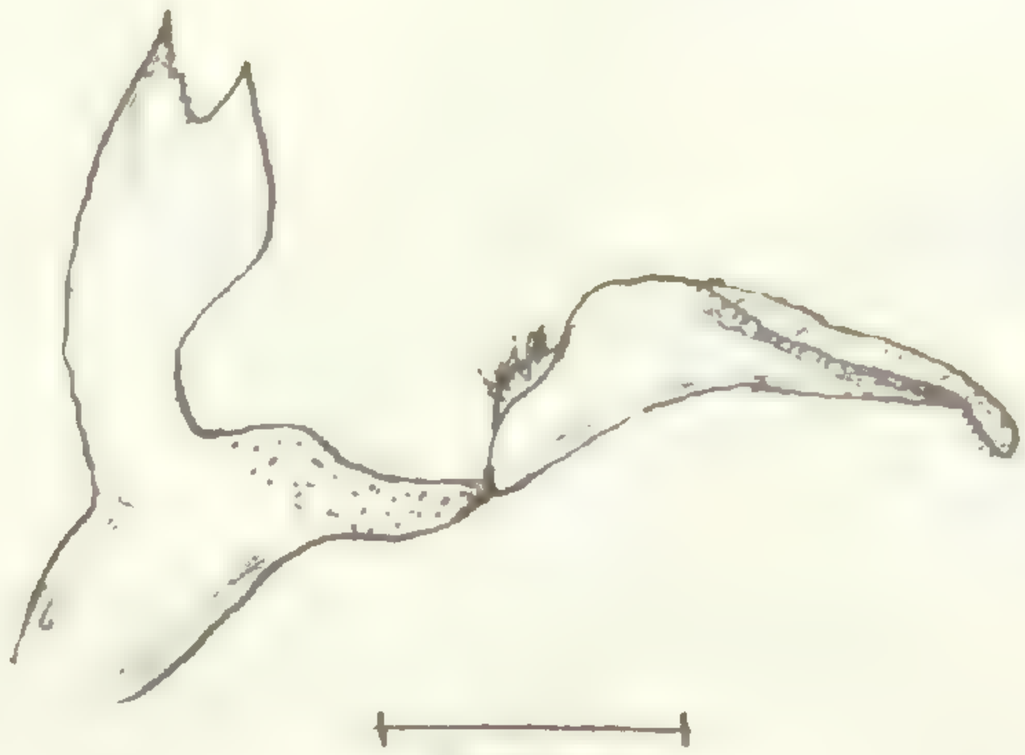
Plate 3. Lepanthes Helleri A. D. Hawkes, sp. nov.

2 cm.

1 cm.



1 cm.

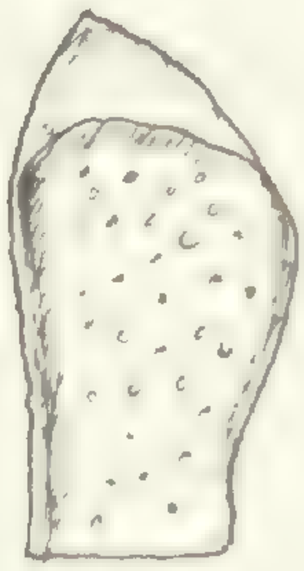


2 mm.

Anther

Column

Lip



Front

Petal

Section

Plate 4. Pleurothallis Alexii A. H. Heller, sp. nov.

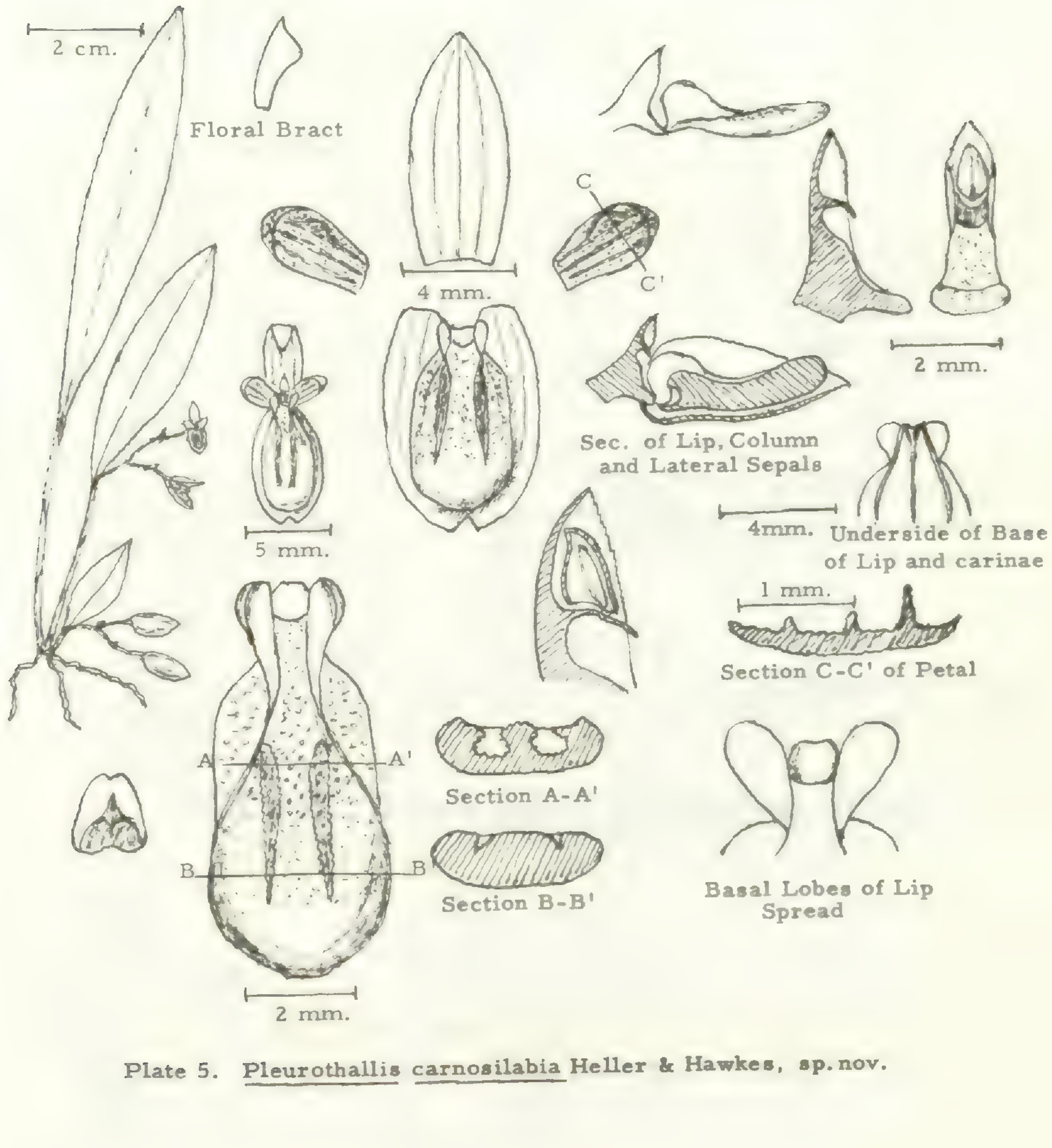


Plate 5. Pleurothallis carnosilabia Heller & Hawkes, sp. nov.

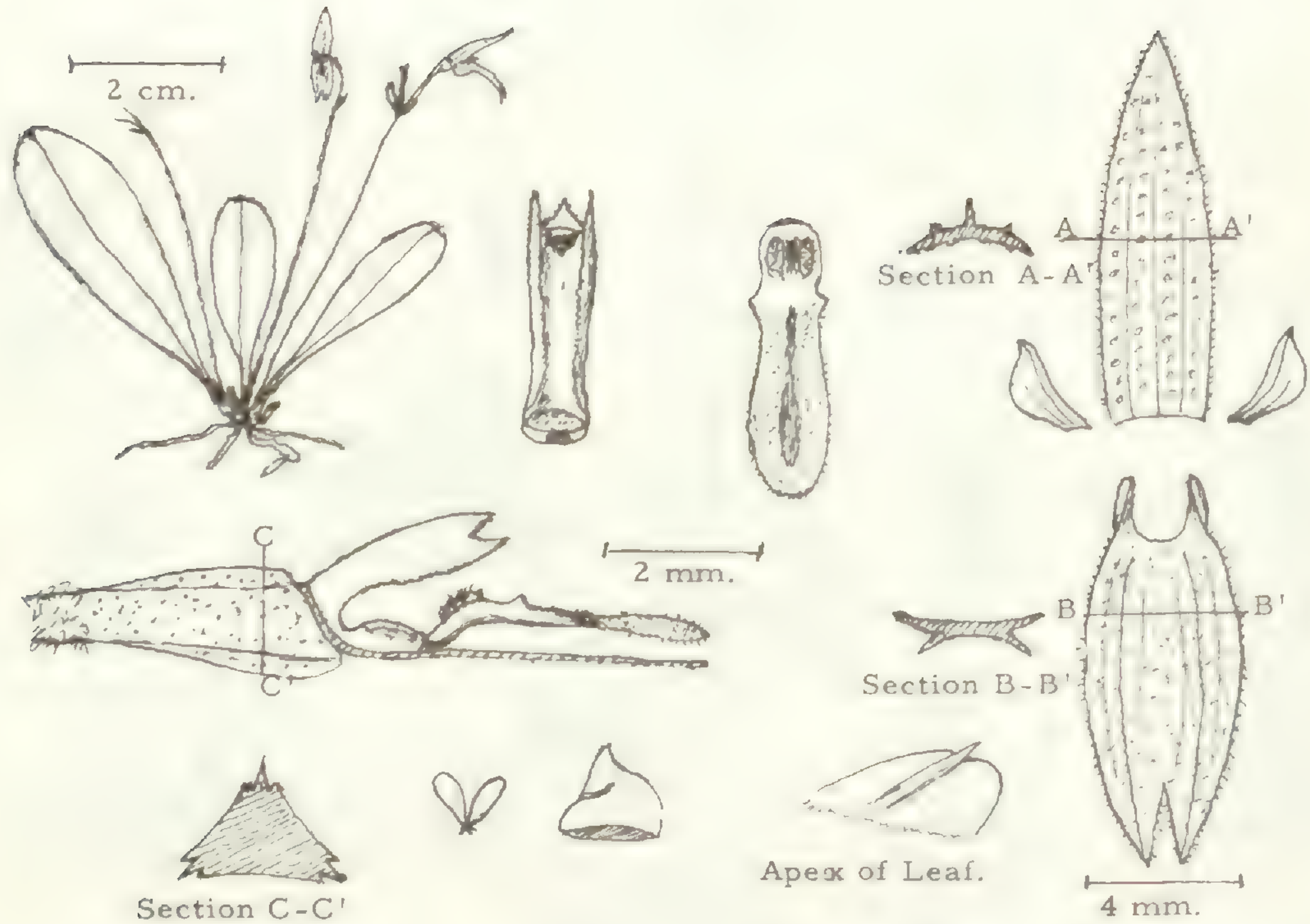
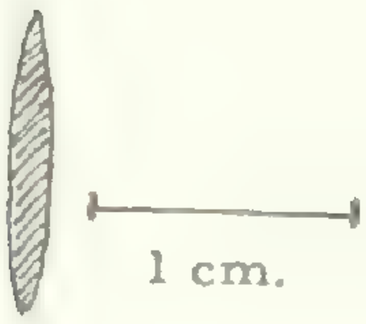


Plate 6. Pleurothallis chontalensis Heller & Hawkes, sp. nov.

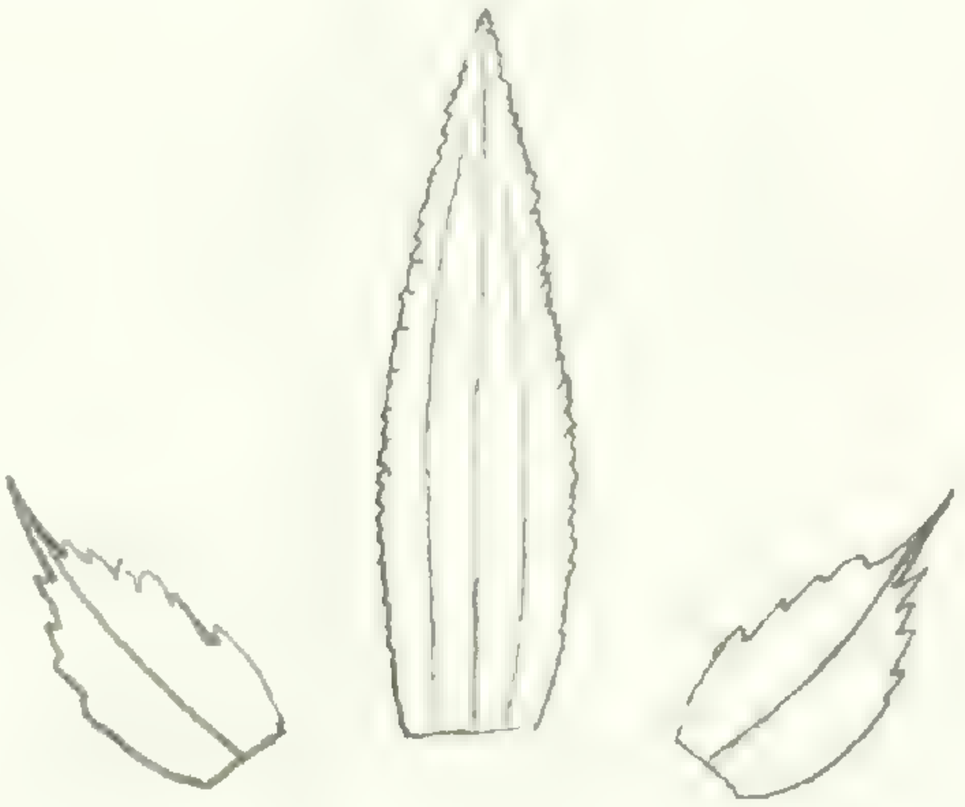
Plate 7. Pleurothallis exesilabia Heller & Hawkes, sp.nov.

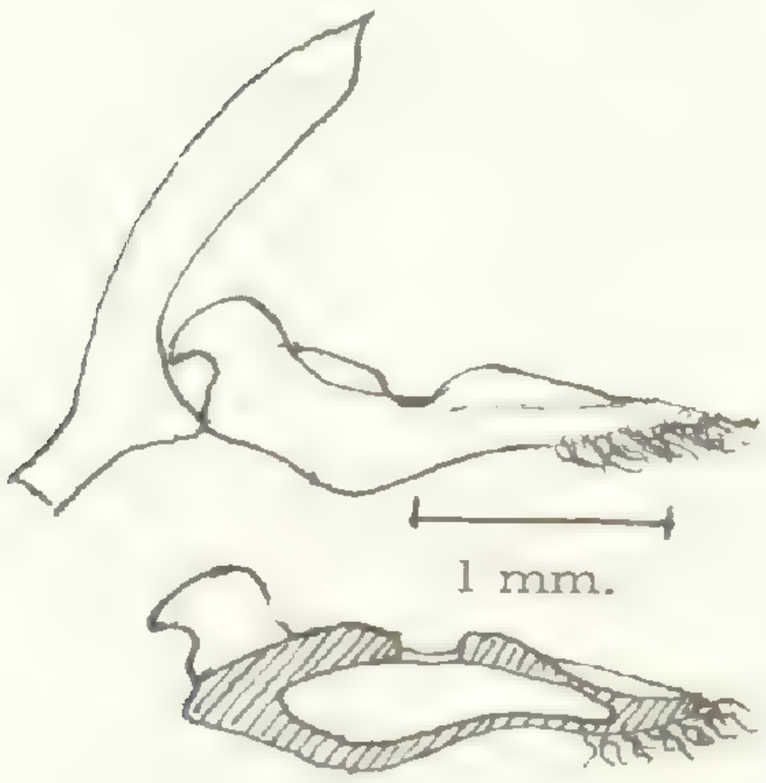
2 cm.



1 cm.

Longitudinal Section of Leaf.





1 mm.

Basal Callus

Basal Auricle

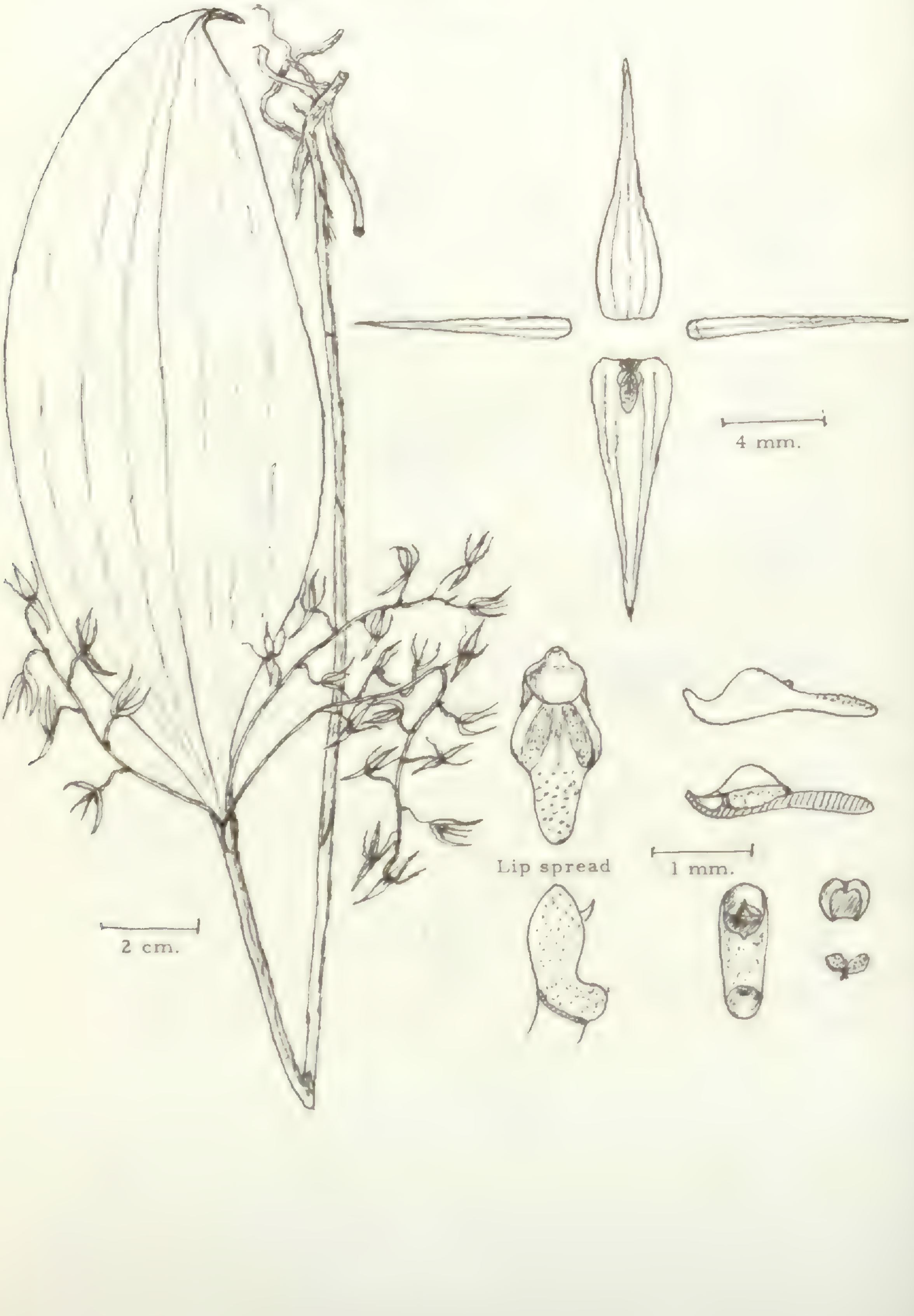
Front of Column

2 mm.

Underside of Lip.

1 mm.

Plate 8. Pleurothallis Helleri A. D. Hawkes, sp. nov.



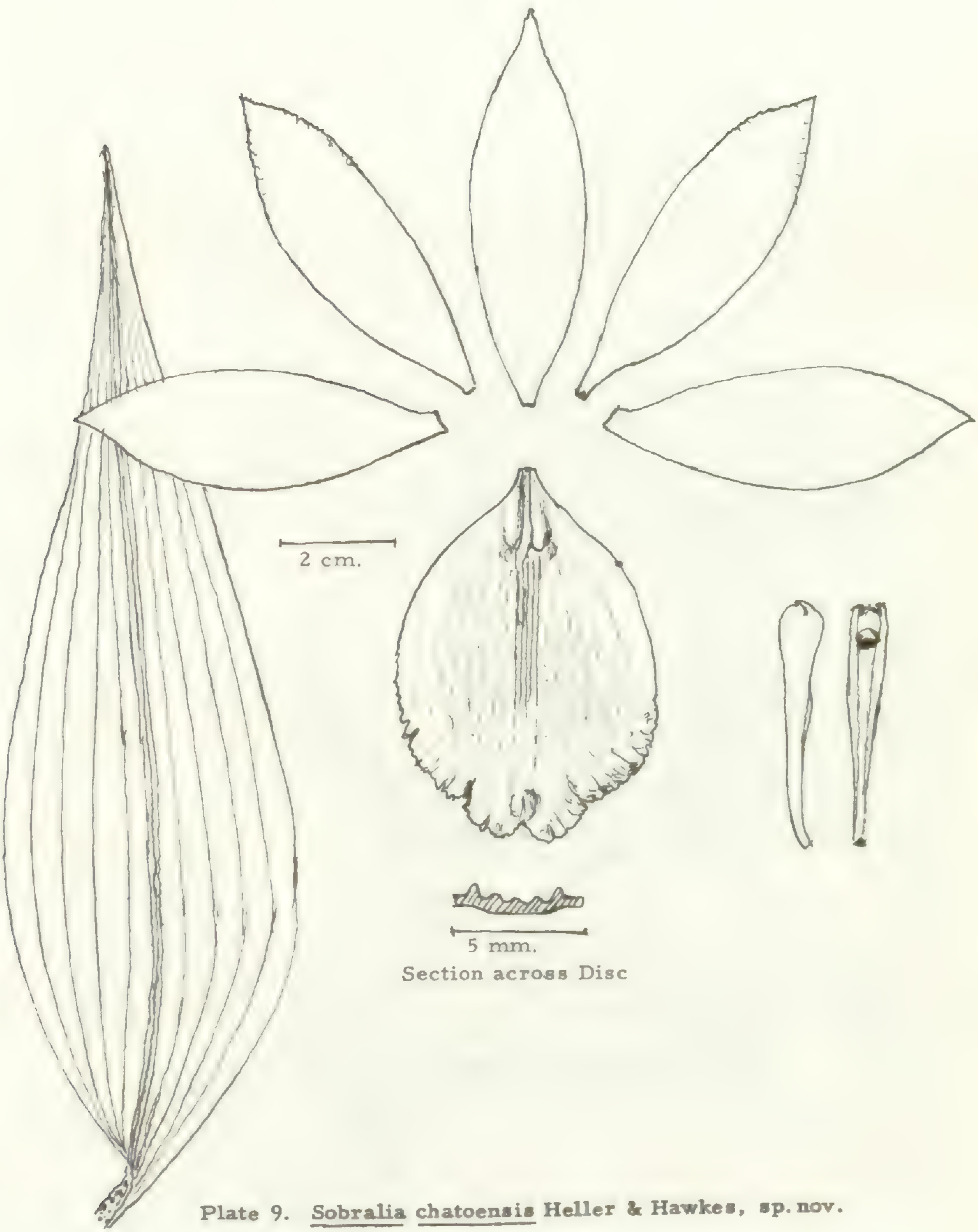


Plate 9. Sobralia chatoensis Heller & Hawkes, sp. nov.

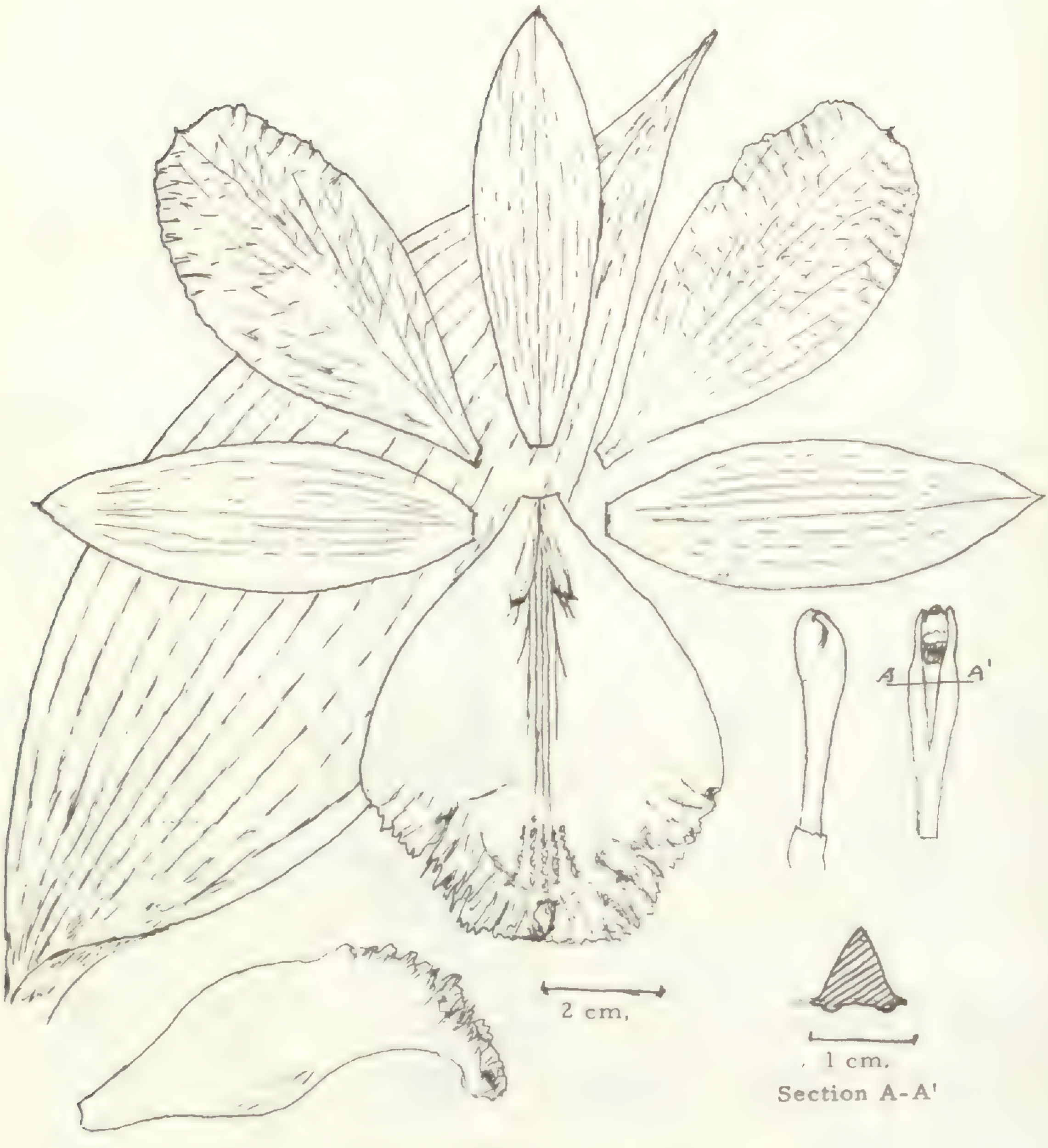


Plate 10. Sobralia Hawkesii A. H. Heller, sp. nov.

Plate 11. Sobralia Helleri A. D. Hawkes, sp. nov.

Plate 12. Sobralia triandra Heller & Hawkes, sp. nov.

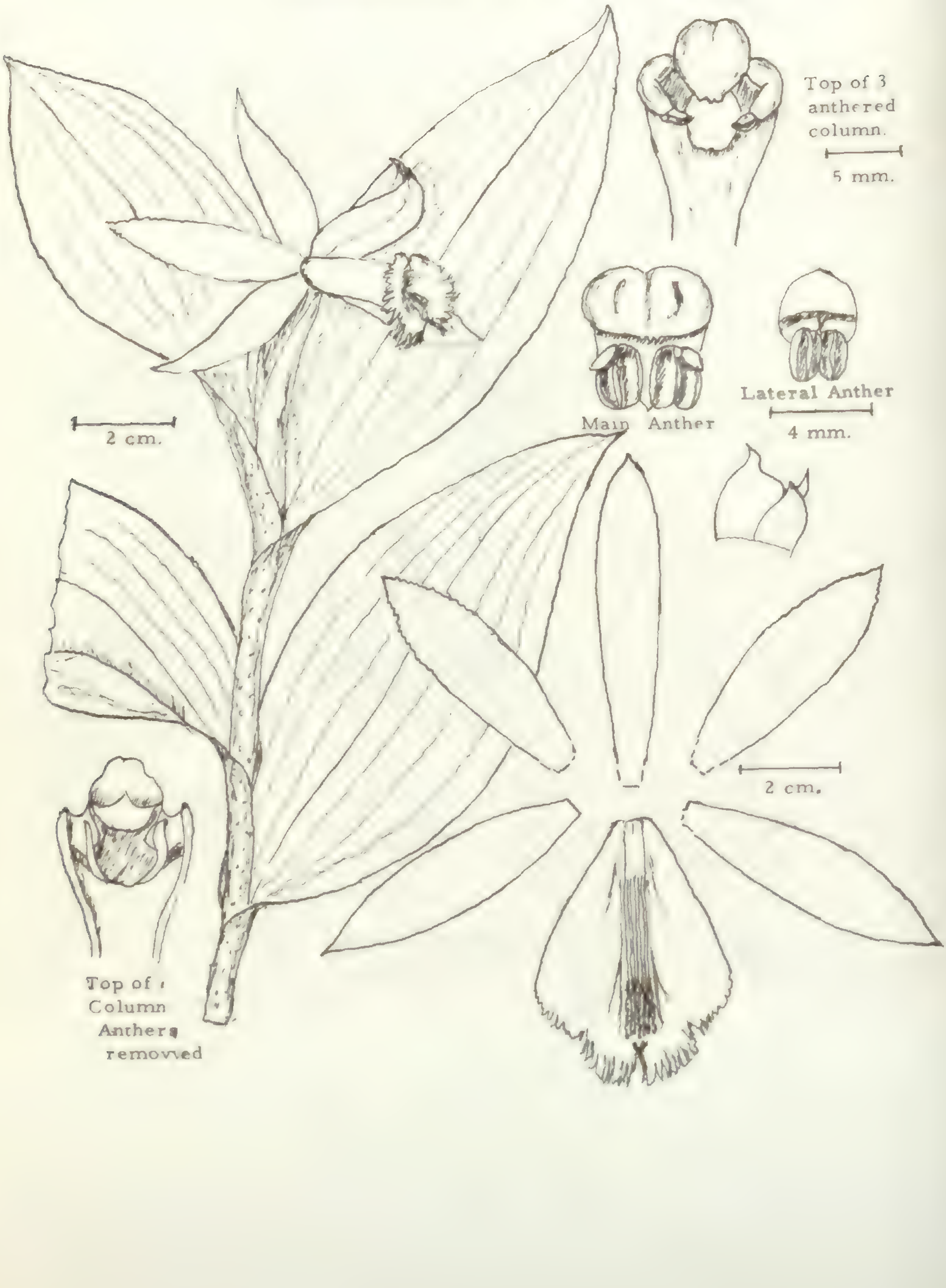
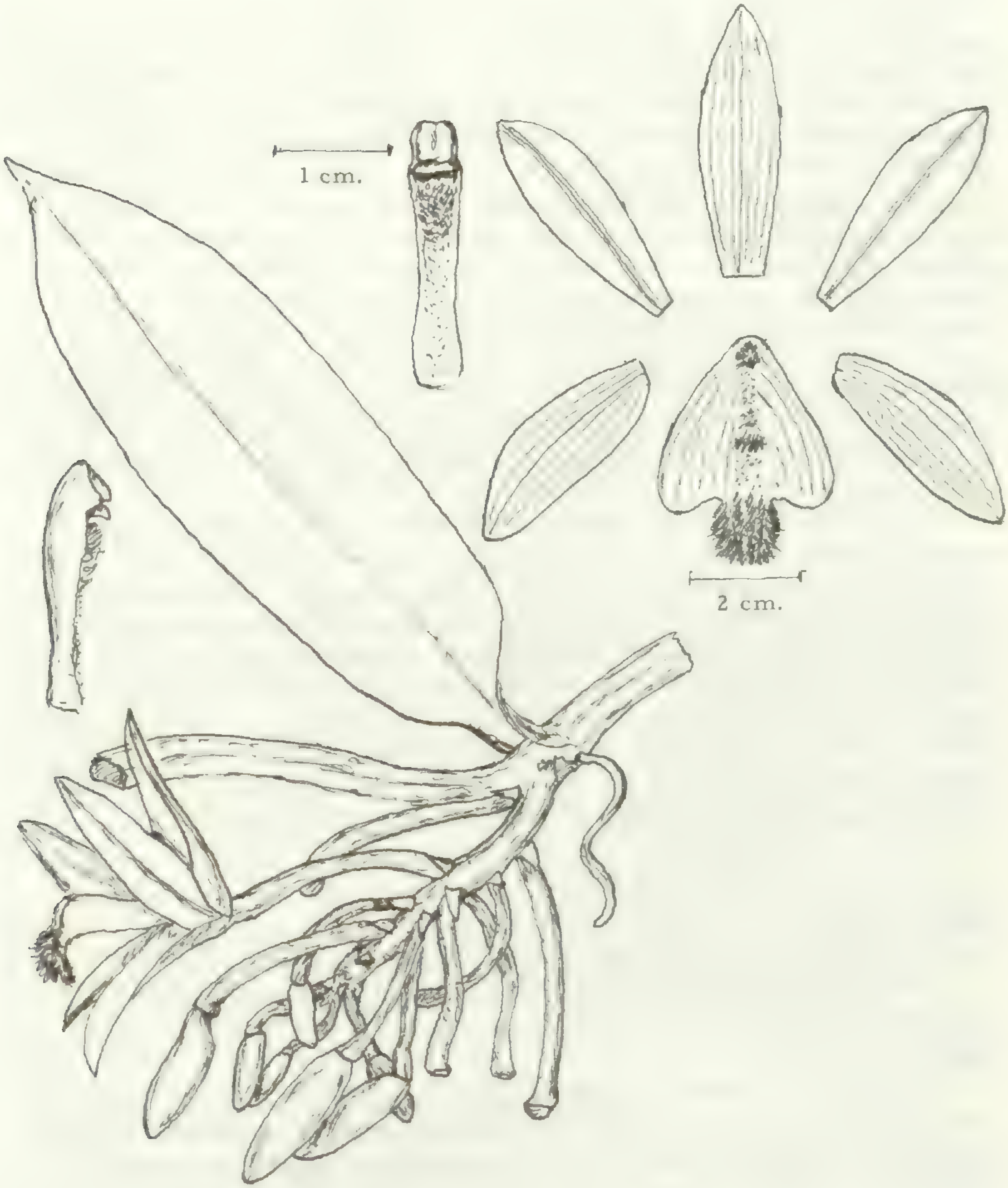


Plate 13. Vanilla Helleri A. D. Hawkes, sp. nov.



ADDITIONAL MATERIALS TOWARD A MONOGRAPH OF THE GENUS CALLICARPA. III

Harold N. Moldenke

CALLICARPA ARBOREA Roxb.

Ridley (1923) records this species from Dinding Island, giving its general distribution as "India, Burma, Sumatra". Craib gives its general distribution as "India, Burma, Assam, Yunnan, Malaya".

Lam (1919) says that "In the bibliography about the subject we discover some indications, that some authors cannot find and difference between C. arborea Roxb. and C. lanata α (e.g., Miq. Fl. Ind. Bat. Suppl. 1, 243 and 569; Koorders en Valeton, Bijdr. Booms. Java.VII, 175). We too, think so. So we have combined the two species under the name C. lanata α, finding no essential difference of any importance, that could separate them distinctly. Even if it should be shown that there are a treelike and a shrubby form, it would not be exact to consider them as more than two varieties of one single species. -- It has a strong affinity with Geunsia farinosa, var. α, from which it is different, however, by its opposite leaves, 4-merous flowers and fissury opening of the anther-cells."

King & Gamble (1908) describe their C. arborea var. villosa as follows: "Leaves 6 to 8 in. long, 3.5 to 4.5 in. broad, ovate, caudate-acuminate at apex, rounded and slightly decurrent at base. Tomentum of branchlets, young leaves, and inflorescences very thick and pale, chiefly consisting of branched hairs. This var. resembles C. lanata, Linn., of southern India and Ceylon in its leaves, but the flowers are those of C. arborea. Perak: Scortechini." For the typical form of the species he cites Ridley 5607 from Kedah, Deschamps s.n. [Batu Gaja jungles] and Curtis 699 from Penang, and Wray 1824 & 3957, Ridley 7179, Scortechini s.n., and King's Collector 972 (in part) from Perak, as well as Teijsmann 4388 and Forbes 1530 & 2601 from Sumatra. He gives the species' distribution as "India (Kumaon) to Assam, Sonthal Parganas, Chota Nagpore, eastern Bengal, Burma, and Sumatra".

Bakhuizen van den Brink (1921) places C. arborea Roxb., C. tectoniolia Wall., and C. villosa Roxb, in the synonymy of C. tomentosa (L.) Murr.

P'ei (1932) places C. vastifolia Diels in the synonymy of C. arborea, but this name actually belongs in the synonymy of Viburnum rhytidophyllum Hemsl. in the Caprifoliaceae. He cites a Schneider 2549 from Yünnan, and says: "Distribution: India to Indochina. The material above cited agrees very closely with the typical Indian form of Callicarpa arborea Roxb. Rock 7197 has smaller leaves which are acute at both ends, but the other characters are same as in C. arborea Roxb. Rock 6977 seems to be identi-

cal with Diels' species, having the subcordate and rotundate leaf bases but acute bases are also found on the same specimen."

Dop (1932) places C. farinosa Roxb. in the synonymy of C. arborea, but it belongs, rather, in that of C. tomentosa (L.) Murr.

Craib (1912) cites Kerr 691 and Hosséus 618 from Thailand. He gives the species' distribution as "India, Burma, Assam, Yunnan, Malaya" and says of Hosséus' C. lanata: "Hosseus' plant in the shape of the leaves is very similar to Callicarpa villosa, Roxb. (Callicarpa arborea, var. villosa, King et Gamble) which originally came from Sylhet. In no case can it be referred to the Indian Callicarpa lanata."

Common and vernacular names recorded for C. arborea include "amboeng-amboeng poetih", "ambong ambong bukit", "bagiha", "bogodi", "bormala", "boropatri", "búndún", "callicarpa arborescent", "daung-sat-pya", "dera", "doika", "doung-hsappya", "doung-sap-pya", "dum kotokoi", "ghivala", "ghiwala", "goehlo", "gogdi", "hahamboe grove", "hoo-kwai", "huquay yai", "kajoe hahomboe", "kajoe si mahahomboe", "kata kran", "khoja", "klui", "kodo", "kozo", "kyunalin", "makanchi", "pha", "pilau merodja", "sakrela", "shiwali", "si tapoeèng", "suk ki kai", "súnga", "tepong", "tepong tepong", "tĕpong-tĕpong", "tindjaoe", and "turmong".

The C. villosa Bald., referred to in the synonymy above, is a synonym of C. americana L., while C. villosa Vahl is a valid species, which see; C. arborea Merr. is a synonym of C. arborea var. psilocalyx (H. J. Lam) Moldenke, C. arborea Miq. is actually C. tomentosa (L.) Murr., and C. arborea Wall. is C. vestita Wall.; C. lanata Gamble is actually C. vestita Wall., C. lanata L. and C. lanata Wall. are C. tomentosa (L.) Murr., C. lanata H. J. Lam is C. arborea var. psilocalyx (H. J. Lam) Moldenke, C. lanata Lam. is Premna tomentosa Willd., and C. lanata Schau., C. lanata Vahl, and C. lanata Zipp. are C. pedunculata R. Br.; C. tomentosa Bakh. is in part C. arborea and in part C. integerrima Champ., C. tomentosa Hook. & Arn. and C. tomentosa Willd. are C. loureiri Hook. & Arn., C. tomentosa König is C. macrophylla Vahl, C. tomentosa L. is C. erioclona Schau., C. tomentosa Lam. is C. candicans (Burm. f.) Hochr., C. tomentosa Murr. is C. tomentosa (L.) Murr., C. tomentosa Thunb. is C. longifolia Lam., and the identity of C. tomentosa Vahl is not yet established.

King & Gamble (1908) distinguish their C. maingayi as follows: "A Callicarpa arborea, Roxb., foliis obtusis subtus pilis minutioribus aureofulvis tectis, corollae tubo longiore et lobis brevioribus distincta."

Lörzing 5857 has the inflorescences tremendously galled, while Rock 7197 has both the leaves and the inflorescences galled. The Herb. Hort. Bot. Bogor. s.n. specimens, cited below, were grown from seeds brought from Sumatra -- there are toothed leaves on some

of the sheets. Yates 1078 in the University of California herbarium has a photograph of the plant mounted on the sheet. Nair & Rehman (1962) describe and illustrate the pollen grains and cite Nat. Bot. Gard. 2209, slide 2653.

Material of C. arborea has been misidentified and distributed in herbaria under the names C. farinosa Roxb., C. lanata var. typica H. J. Lam, C. pentandra Roxb., C. pentandra var. typica f. farinosa (Blume) Bakh., C. reevesii Wall., C. wallichiana Walp., Geunsia farinosa Blume, and G. pentandra (Roxb.) Merr. On the other hand, the Carr 11317, distributed as C. arborea, is actually C. macrophylla Vahl, and H. O. Forbes 1530 and Rock 983 are C. tomentosa (L.) Murr.

Merrill (1903) cites his no. 687 from Mindanao, but it is probable that this is actually var. psilocalyx. He says "No. 540 represents a related form, but quite distinct!" He gives the distribution of the species as "Himalayan region to Sumatra and New Guinea". Ridley (1920) cites his no. 6592 from Koh Gah, Malaya, and gives the distribution of the species as merely "Malay Peninsula". In his 1923 work he cites Nur 7264 from Sibolangit, Bukit Kramat Kuda.

Dop (1932) cites the following specimens: THAILAND: Kerr 691. INDOCHINA: Annam: Chevalier 32505; Poilane 1612. Cambodia: Harmand s.n. [Pnom Penh]; Pierre 1220. Cochinchina: Pierre 182. Laos: Harmand 1199; Massie s.n. [Attopeu]; Perrot s.n. [Attopeu]; Thorel s.n. [Paklai]. Tonkin: Balansa 3811, 3812, 3813; Chevalier 29497. He comments: "Pour H. J. Lam et Bakhuizen van den Brink le binôme C. arborea est tombé en synonyme pour des raisons de priorité assez douteuses, les diagnoses princips des auteurs antérieurs à la monographie de Schauer dans le Prodrome de De Candolle étant en général insuffisantes. Comme le binôme C. arborea a été utilisé par tout les auteurs des travaux modernes sur les flores indosino-malaises: Kurz, Clarke, Brandis, Prain, King et Gamble, Craib, Dunnet Tutcher, etc., il y a lieu de le maintenir."

In all, 207 herbarium specimens have been examined by me.

Additional citations: PAKISTAN: East Bengal: W. Griffith 6037 (Cp, Cp, S). NEPAL: Ram 300 (N). SIKKIM: Kuntze 7056 (N), 7195 (N); T. Thomson s.n. [Sikkim] (Bz—18665, Bz—18666). INDIA: Assam: Chand 4452 (Mi), 5098 (Mi), 6095 (Mi); Chatterjee s.n. [Shakhati, May 1902] (Po—64810); Collector undetermined s.n. [Assam] (W—9972); Jenkins s.n. [Assam] (Bz—18662, Bz—18669, Bz—18670, Bz—18671, Bz—18673, Bz—18674); Koelz 22718 (Mi), 24501 (Mi), 24861 (Mi), 25043 (Mi), 25478 (Mi), 28877 (Mi), 30119 (Mi); Peal 191 (W—261235), 220 (W—261234); Simons s.n. [Assam] (Bz—18672); G. Watt 11305 (Na—12912). Khasi States: Hooker & Thomson s.n. [Mont. Khasi] (M, S); G. Mann s.n. [Khasia] (Bz—18661). Madras: Koelz 10846 (Mi). Manipur: Meebold 7120 (S). Uttar Pradesh: Har-

sukh 500 (S); Koelz 20534 (Bv, Bv, N). West Bengal: C. B. Clarke 11723 (W--802338), 11813b (Bz--18667); Mukerjee 1561 (S). State undetermined: Duthie 24835 [Shimala] (Ca--269793). BURMA: Tenasserim: Brandis s.n. [Pegu] (Bz--18659); Falconer 505 (Bz--18657); Helfer 6037 (T). Upper Burma: Forrest 24684 (W--1377450); Khalil s.n. [Southern Shan States, 1893] (W--369326); Khan 139 (Bz--18658); Kingdon-Ward 22196 (Bm). ANDAMAN ISLANDS: Barren: Prain s.n. [April 1891] (W--261236). CHINA: Kwangsi: Ching 7291 (N, W-1248676); Tsang 23914 (N). Yunnan: Forrest 21079 (W--1278917); A. Henry 9551A (W--457158), 12093 (N), 12093a (N); J. F. C. Rock 6977 (Ca--328045, W--1332122), 7197 (Ca--328416, W--1332123). THAILAND: Bunkird s.n. [Herb. Roy. Forest Dept. 25225] (Bk); Chamruaengsri 39 [Herb. Roy. Forest Dept. 1945] (W--2064781); Mrs. D. J. Collins 1251 (W--1701059); Khantchai 350 [Herb. Roy. Forest Dept. 15879] (Mi), 1080 [Herb. Roy. Forest Dept. 24283] (Mi); Khit 128 (S); Kostermans 55 (Bz--73295); J. F. C. Rock 1589 (W--1214547); Sindhiponse 45 [Herb. Roy. Forest Dept. 6019] (W--2064827); Sørensen, Larsen, & Hansen 238 (Cp), 2973 (Z). INDOCHINA: Annam: Poilane 1612 (B). Cambodia: Pierre 1220 (B, N, W--1757963). Cochinchina: Pierre s.n. [1866] (N). MALAYA: Kedah: Padaichee s.n. [Corner 37691] (Bz--18655). Penang: Haniff 249 (Ca--355042, La). Perak: M. R. Henderson 23754 (N), 23757 (Bz--18656). INDONESIA: GREATER SUNDA ISLANDS: Batu: Raap 32 (Bz--18653), 385 (Bz--18652). Sumatra: Ajoeb 3 (Bz--18638, Bz--18639); Asdat 2 (Bz--72620, Bz--72621); H. H. Bartlett 6448 (Mi, N, S); Bartlett & La Rue 361 (Ca--243845); Boesa 8244 (N); Bünnemeijer 248 (Bz--18626), 2548 (Bz--18624, Bz--18625), 3671 (Bz--18622, Bz--18623, Bz--25487); Buwalda 7136 (Bz--72616); Collector undetermined s.n. (Bz--18620); Cramer 91 (Bz--18637); Diepenhorst 2563 B.B. (Bz--18617); Endert 65 (Bz--18633, Bz--18634); Idenburg 32 (Bz--18608, Bz--18609); Jacobson 204 (Bz--18642); Junghuhn s.n. (Ut--53392); Karta 54 (Bz--18694, Bz--18695, N), 71 (Bz--18696); Koorders 901* [29479b] (Bz--18649), 10477b (Bz--18648), 29479b (Bz--18650, Bz--18651); Krukoff 248 (Bz--18615, N), 349 (Bz--18614, N); Lörzing 3135 (Bz--18627, Bz--18628), 3522 (Bz--18630), 5857 (Bz--18644, Bz--18645), 7933 (Bz--18635), 9984 (Bz--18612), 11239 (Bz--18643); Nur 7264 (Bz--18697); M. M. S. Pieters 69 [bb.3061] (Bz--18629); Posthumus 728 (Bz--18610, Bz--18611, Ut--96830); Römer s.n. [Nias] (Bz--18654); Teijsmann 1164 H.B. (Bz--18618, Bz--18619), 1164-2563-3525 (Bz--18621), 3525 H.B. (Bz--18616, Ut--53391), 4388 H.B. (Bz--18640, Bz--18641, Ut--53394), s.n. (Bz--18699, Bz--18700); Toroes 1045 (N), 3646 (N), 4363 (N); Van Steenis 3 (Bz--18613), 6262 (Bz--18704); Voogd 1211 [bb.16346] (Bz--18698); H. S. Yates 629 (Ca--226102, Mi), 1078 (Bz-72799, Ca--251168, Mi, N, S), 2651 (Bz--18675, Ca--325716, Mi, N,

S). MELANESIA: NEW GUINEA: Papua: Brass 528 (Bz—17462), 3675 (Bz—18676); Carr 11535 (N); M. S. Clemens 10870 P (Ca—180781); Hoogland 3905 (Ng—16872, Ng). CULTIVATED: Hawaiian Islands: F. Brown 1276 (Bi, Bi). India: Herb. Hort. Bot. Calcutt. D.8 (Bz—18660), s.n. (Br, Bz—18663, Ed, Mu—951, T, X); Wallich 1826 (Ed, Mu—1427, S), s.n. (Cp, Cp). Java: Herb. Hort. Bot. Bogor. XI.G.83 (Bz—25791, Bz—25792, Bz—26526, Bz—26593, Bz, Bz, N, N), XI.G.83a (Bz), s.n. (Bz—18688, Bz—18689, Bz—18690, Bz—18691, Bz—18692). Pakistan: Kurz s.n. [Sibpur, lower Bengal, 5/67] (Bz—18664). Sumatra: Herb. Hort. Sibolangit 146 (Bz—26507). LOCALITY OF COLLECTION UNDETERMINED: C. B. Clarke 11723b (Bz—18668); Collector undetermined s.n. [Tonagyas] (W—261233); Griffith 6037 [Burma or Malay Peninsula] (Ut—11537); Teijsmann 64 H. B. [Sitapong] (Ut—53393).

CALLICARPA ARBOREA var. PSILOCALYX (H. J. Lam) Moldenke, Phytologia 4: 125. 1952.

Synonymy: Callicarpa magna Schau. in A. DC., Prodr. 11: 641. 1847. Callicarpa manga Schau. apud Elm., Leafl. Philip. Bot. 3: 865, sphalm. 1910. Callicarpa lanata var. psilocalyx H. J. Lam, Verbenac. Malay. Arch. 81. 1919. Callicarpa tomentosa var. magna (Schau.) Bakh., Bull. Jard. Bot. Buitenz., ser. 3, 3: 22. 1921. Geunsia straminea Elm. ex Bakh., Bull. Jard. Bot. Buitenz., ser. 3, 3: 22, in syn. 1921. Callicarpa magna var. lilacina Elm., Leafl. Philip. Bot. 9: 3222. 1934. Callicarpa arborea Merr. ex Moldenke, Prelim. Alph. List Invalid Names 9, in syn. 1940 [not C. arborea Miq., 1885, nor Roxb., 1814, nor Wall., 1829]. Callicarpa lanata H. J. Lam ex Moldenke, Prelim. Alph. List Invalid Names 11, in syn. 1940 [not C. lanata Gamble, 1878, nor Hosséus, 1912, nor L., 1771, nor Lam., 1821, nor Schau., 1893, nor Vahl, 1856, nor Wall., 1940, nor Zipp. 1841].

Bibliography: Schau. in A. DC., Prodr. 11: 641. 1847; Miq., Fl. Ind. Bat. 2: 889. 1856; Bocq., Adansonia 3: [Rev. Verbenac.] 192. 1863; Vidal, Revis. Pl. Vasc. Filip. 208. 1886; Jacks. in Hook. f. & Jacks., Ind. Kew. 1: 386. 1893; Briq. in Engl. & Prantl, Nat. Pflanzenfam. 4 (3a): 166. 1895; Elm., Leafl. Philip. Bot. 3: 865—866. 1910; E. D. Merr., Philip. Journ. Sci. Bot. 12: 298. 1917; H. J. Lam, Verbenac. Malay. Arch. 80 & 81. 1919; Bakh., Bull. Jard. Bot. Buitenz., ser. 3, 3: 21 & 22. 1921; E. D. Merr., Enum. Philip. Flow. Pl. 3: 386. 1923; H. J. Lam in Lauterb., Engl. Bot. Jahrb. 59: 89. 1924; Elm., Leafl. Philip. Bot. 9: 3222. 1934; Moldenke in Fedde, Repert. Spec. Nov. 40: 49. 1936; Moldenke, Alph. List Common Vern. Names 3 & 20. 1939; Moldenke, Prelim. Alph. List Invalid Names 9, 11, 13, & 26. 1940; Moldenke, Known Geogr. Distrib. Verbenac., ed. 1, 62 & 87. 1942; Moldenke, Alph. List Invalid Names 8, 9, 11, 25, & 94. 1942; Moldenke, Phytologia 2: 94. 1945; Moldenke, Known Geogr. Distrib. Verbenac., ed. 2,

140, 141, & 177. 1949; Moldenke, Alph. List Cit. 4: 1259. 1949; Moldenke, Phytologia 4: 77, 122, & 125. 1952; Moldenke, Biol. Abstr. 27: 984. 1953; Moldenke, Résumé 182, 241, 244, 245, 247, 295, & 443. 1959; Moldenke, Résumé Suppl. 3: 30 (1962) and 14: 7. 1966; Moldenke, Phytologia 13: 501 & 502. 1966.

This variety differs from the typical form of the species in having membranous leaf-blades which are only rather densely farinose-tomentose and canescent or even subglabrate on the lower surface and the calyx glabrous or with only a few scattered hairs on the outer surface.

It is described as a tall tree, 22--30 feet in height; trunk 4 1/2 to 8 inches in diameter at breast height; bark smoothish, pale yellowish-green; branchlets densely floccose-rufescent; leaves long-petiolate; petioles densely floccose-rufescent; leaf-blades membranous, elliptic or oblong-ovate, 15--22.5 cm. long, short-acuminate at the apex, rounded at the base and shortly prolonged into the petiole, glabrate above when mature, venose-reticulate and farinose-canescent with stellate tomentum beneath; cymes many-flowered, divaricate-dichotomous, loosely corymbose, the branches densely floccose-rufescent; peduncles about half as long as the petioles; calyx exiguous, membranous, about 1 mm. long, glabrous, 4-costate, scarcely 4-dentate on the rim; corolla campanulate, twice as long as the calyx, its limb velutinous above.

The variety was based by Lam on Cuming 1266 from the province of Albay, Luzon, Philippine Islands [cited from Manila by Bocquillon (1863)], on M. Ramos 395 [August 1910] and 15038 from San Antonio, province of Laguna, Luzon, and on Nyman 1053 from Friedrich Wilhelmshafen, October 1, 1899, Rodatz & Klank 185 and Schlechter 16454 from Northeastern New Guinea. He cites Lauterbach 1200 & 1241 from Constantinshafen with a question. In his 1924 work he is in doubt only about the 1200 collection and spells the collector's surname "Klink".

The type of C. magna is also Hugh Cuming's no. 1266; that of C. magna var. lilacina was collected by Adolph Daniel Edward Elmer (no. 22377), and that of Geunsia straminea is Elmer 8193, both also from the island of Luzon.

Bakhuizen van den Brink (1921) regarded C. sorsogonensis Elm. as a synonym of the taxon here under discussion, but I regard it as a synonym of Geunsia paloënsis (Elm.) H. J. Lam. He modified the varietal description [including C. sorsogonensis] as follows: "Folia adulta subtus dense tomentosa vel subfarinosa mollia vel subrugosa, tomento in sicco subpersistente canescenti; 10—25 c.M. longa; 5—10 c.M. lata; cymi mediocres vel majusculi, pedunculo petiolum sub-aequante vel saepe majore, raro breviore; calyx glabra vel pilis sparsis stellatis; corolla extus subglabra vel dorso laciniarum velutina; ovarium glabrum raro sparse pilis stellatis vestitum, glandulis punctis crebris densissime tectum." He cites Elmer 16939, but this I regard as Geunsia paloënsis.

Callicarpa arborea var. psilocalyx has been found growing in old secondary forests, at 700--800 meters altitude, flowering in May, July, and October, fruiting in October. The R. S. Williams 1003 collection includes a wood sample. Vernacular names reported for the plant are "atímla", "gagayok", and "magílig". Material has been misidentified and distributed in herbaria as Premna sp.

In all, 22 herbarium specimens, including type material of all the names involved, and 3 mounted photographs have been examined by me.

Citations: WESTERN PACIFIC ISLANDS: PHILIPPINE ISLANDS: Luzon: Cuming 1266 (N--cotype, Z--photo of cotype); Elmer 8193 (Bz--18686, N), 9125 (Bz--18684, N, Ut--26960, Vt), 17575 (Bz--18687, Ca--271612, N, S, Ut--67267), 22377 (Bz--18096, Ca--7763, Mi, N); M. Ramos 395 (N--photo of cotype, Ut--22195--cotype, Z--photo of cotype); R. S. Williams 1003 (N, N, W--707311). Mindanao: D. Fairchild 157 (W--1941383); Zwickey 287 (Mi).

CALLICARPA AREOLATA Urb. in Fedde, Repect. Spec. Nov. 20: 346. 1924.

Bibliography: Urb. in Fedde, Repert. Spec. Nov. 20: 346. 1924; A. W. Hill, Ind. Kew. Suppl. 7: 36. 1929; Moldenke in Fedde, Repert. Spec. Nov. 39: 301 (1936) and 40: 63--64, 119, 123, & 129. 1936; Moldenke, Geogr. Distrib. Avicenn. 4. 1939; Moldenke, Known Geogr. Distrib. Verbenac., ed. 1, 24 & 86. 1942; Moldenke, Alph. List Cit. 1: 75 & 185 (1946), 2: 487, 648, 649, & 651 (1948), 3: 713 & 929 (1949), and 4: 1034. 1949; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 42 & 176. 1949; Alain in León & Alain, Fl. Cuba 4: 305 & 309. 1957; Moldenke, Résumé 50 & 443. 1959; J. A. Clark, Gen. Sp. Pl. n.d.

Recent collectors have found this plant growing on limestone and at the borders of limestone cliffs, at 60 meters altitude, flowering in July, and fruiting in May and July. Material has been misidentified and distributed in herbaria as C. grisebachii and C. oblanceolata Urb.

In all, 24 herbarium specimens, including the type (now destroyed), and 11 mounted photographs have been examined by me.

Additional citations: CUBA: Oriente: Acuña 17184 (N); Acuña & Barreto 17442 (Es); Acuña, Cereza, & Montenegro 17184 (Es); Alain & Morton 5222 (Z); G. C. Bucher 1024 [Herb. Roig 7604] (Es), 10558 (Es); Ekman 3614 (E--photo of type, S--photo of type, W--photo of type), 4487 (N); León 17158 (Ha, N), 17269 (Ha, N); León & Victorin 17331 (Ha); Matos s.n. [León 17738] (Ha, N), s.n. [León 18378] (Ha, N).

CALLICARPA AUSTRALIS Koidz., Bot. Mag. Tokyo 30: 326. 1916.

Bibliography: Koidz., Bot. Mag. Tokyo 30: 326. 1916; A. W. Hill, Ind. Kew. Suppl. 6: 34. 1926; Moldenke, Known Geogr. Distrib. Verbenac., ed. 1, 58 & 86 (1942) and ed. 2, 133 & 177.

1949; Moldenke, Résumé 172 & 443. 1959.

Shrub, the young portions of the branchlets and the buds gilvous-floccose-tomentose, the older branches becoming cinereous; leaves decussate-opposite; petioles 1--3 cm. long, soon glabrescent; leaf-blades membranous, elliptic or oblong, 7--20 cm. long, 4--8 cm. wide, acute to acuminate at the apex, serrate-dentate along the margins, subentire toward the base, acute or acutely attenuate at the base, loosely floccose on the venation on both surfaces, otherwise glabrous, minutely granular-flandulose beneath; secondaries 7--10 per side; cymes ample, greatly many-flowered, soon glabrescent; peduncles equaling the petioles or rarely twice as long; bractlets linear, deciduous; calyx-tube cupuliform, minutely granular-glandulose on the outer surface, the rim obsoletely 4-dentate; corolla-tube turbinate, glabrous, somewhat longer than the semi-orbicular recurved lobes; anthers exserted, minutely granular-glandulose.

No type is designated for this species and it is said by the author to grow in "Sikoku, Kiusiu, Lutchu", with the vernacular name of "oh-murasaki". He classifies it in the section Cyathimorphae and says of it "Haec species C. japonicae affinis, sed ab ea differt foliis majoribus breviter acuminatis basi non sensim cuneatis, petiolis multo longioribus; cyma ampla supradecomposita valde multiflora." I have seen no authentic material of it and am inclined to think that it may prove to be synonymous with C. japonica var. luxurians Rehd.

CALLICARPA BARBATA Ridl., Kew Bull. Misc. Inf. 1929: 260--261. 1929.

Bibliography: H. N. Ridl., Kew Bull. Misc. Inf. 1929: 260--261. 1929; A. W. Hill, Ind. Kew. Suppl. 8: 37. 1933; Moldenke, Known Geogr. Distrib. Verbenac., ed. 1, 65 & 86 (1942) and ed. 2, 145, 146, & 177. 1949; Moldenke, Résumé 192, 193, & 443. 1959; Anon., Kew Bull. Gen. Index 1929-1956, 59. 1959.

Very hirsute shrub; leaves decussate-opposite; leaf-blades chartaceous, large, obovate, 31 cm. long, 16 cm. wide, acute at the apex, undulate and denticulate along the margins, long-attenuate at the base and decurrent into the petiole, the margins and venation red-hirsute with plumose hairs; secondaries 10 per side; veinlet reticulation elevated beneath, sparsely rufescent-pilose above; panicles robust, borne on the stems in the axils of fallen leaves, 9 cm. long, 8 cm. wide, many-flowered, stellate-pubescent; peduncles and inflorescence-branches 4-angled; pedicels slender, 2 mm. long; bractlets lanceolate, 2 mm. long; calyx cupuliform, 3 mm. long, glabrous, its rim obscurely 5-dentate; corolla 5 mm. long, glabrous, its lobes 5, oblong, obtuse at the apex; stamens 5; anthers oblong, 4 mm. long, glandulose on the outside; filaments very short; style equaling the stamens; stigma capitate; fruiting-calyx patelliform, 7 mm. wide; fruit globose, 5 mm. wide, 4-celled, each cell 1-seeded.

The type of this species was collected by George Darby Haviland (no. 3043) at Rejang Kapit, Sarawak, in March, 1893, and is depos-

ited in the herbarium of the Royal Botanic Gardens at Kew. The author says of the plant "C. basilanensi Merrill approximat, sed foliis magnis barbatis, floribus in paniculis robustis longe pedicellatis glabris corolla 5-loba staminibus 5 distincta....The flowers are all in bud; probably the filaments lengthen as does the style when in flower. A very distinct plant with large hairy leaves, the stem bearded. The hairs are not simple, but possess numerous lateral branches, making them plumose."

Nothing is known to me of this species except what is stated about it in the bibliography.

CALLICARPA BASILANENSIS Merr., Philip. Journ. Sci. Bot. 3: 263. 1908.

Bibliography: E. D. Merr., Philip. Journ. Sci. Bot. 3: 263. 1908; Prain, Ind. Kew. Suppl. 4: 34. 1913; H. J. Lam, Verbenac. Malay. Arch. 52--53 & [361]. 1919; Bakh., Bull. Jard. Bot. Buitenz., ser. 3, 3: 11. 1921; E. D. Merr., Enum. Philip. Flow. Pl. 3: 382. 1923; Moldenke, Alph. List Common Vern. Names 19. 1939; Moldenke, Known Geogr. Distrib. Verbenac., ed. 1, 61 & 86. 1942; Moldenke, Phytologia 2: 93. 1945; Moldenke, Known Geogr. Distrib. Verbenac., ed. 2, 140 & 177. 1949; Moldenke, Résumé 182 & 443. 1959; Moldenke, Résumé Suppl. 12: 8. 1965.

Small tree, 5--10 m. tall, cauliflorous, the young parts covered with dense rust-colored hairs; leaves decussate-opposite; petioles 1--2 cm. long, hairy; leaf-blades subcoriaceous, oblong to ovate or elliptic-oblong, 25 cm. long, 12 cm. wide or less, long caudate-acuminate at the apex, entire, rounded or acute at the base, hirsute above with simple hairs and papillae, rather densely stellate-tomentose beneath; secondaries 9--12 per side; cymes fasciculate, borne in the axils of the fallen leaves, 2--2.5 cm. long, densely stellate-tomentose; flowers glabrous; calyx 3 mm. long, 2.5 mm. wide at the apex, the rim 4-toothed; corolla 7--8 mm. long, the lobes 4 or sometimes 5; filaments 5 mm. long; anthers 3--3.5 mm. long; stigma more or less 4-lobed; fruit globose, 5 mm. wide, composed of 4 pyrenes.

This species was based by Merrill on two collections made by Wallace Irving Hutchinson [Herb. Philip. Forest Bur. 3974 & 6124] in January and July, 1906, and on an unnumbered one made by Hans Gottfried Hallier in January, 1904, all on the island of Basilan, Philippine Islands, and deposited in the herbarium of the Bureau of Science at Manila, but now destroyed. The Hallier specimen cited below has "Jan. 1904" on its label, and so it is doubtless of the original cotype collection, but it also has the number "4425", apparently added in ink later. The Hutchinson collection, also cited below, is probably a topotype. The Pascua s.n. [Herb. Philip. Forest Bur. 30230] collection has "Basilan and Zamboanga, Mindanao" on its label and so may actually consist of material collected on both these islands.

Merrill (1908) says that this is "A species well characterized by its large, acuminate, entire leaves, fascicled cymes from the axils of fallen leaves, and rather large glabrous flowers, which

are rarely 5-merous, hence intermediate between Callicarpa and Geunsia." Lam (1919) says "This plant is nearly related to Geunsia Cumingiana var. β e.g. by its sometimes 5-merous flowers." Bakhuizen van den Brink (1921) places it in the synonymy of what he calls C. pentandra var. cumingiana f. typica Bakh. [=Geunsia cumingiana (Schau.) Rolfe].

The species has been found growing in rain forests and "parang" at altitudes of 300 meters. Vernacular names recorded for it are "gagayuc" and "linagop". Material has been misidentified and distributed in herbaria under the names C. pentandra f. pubescens Bakh., C. pentandra var. cumingiana f. typica Bakh., and C. pentandra var. cumingiana f. genuina Bakh.

In all, 9 herbarium specimens, including cotype material, have been examined by me.

Citations: WESTERN PACIFIC ISLANDS: PHILIPPINE ISLANDS: Basilan: Hallier 1425 (Le—937.287-53—cotype); W. I. Hutchinson s.n. [Herb. Philip. Bur. Sci. 6124] (N—cotype); Pascua s.n. [Herb. Philip. Forest Bur. 30230] (B, Ca—320987, N); C. B. Robinson s.n. [Herb. Philip. Bur. Sci. 11502] (Bz—18202). Mindanao: Ramos & Edaño s.n. [Herb. Philip. Bur. Sci. 36727] (Bz—18196). Santa Cruz: S. Olsen 953 (Cp), 990 (Cp).

CALLICARPA BASITRUNCATA Merr. ex Moldenke, Bol. Soc. Venez. Cienc. Nat. 11: 49, nom. nud. (1947), Phytologia 3: 406—407. 1951.

Bibliography: Moldenke, Bol. Soc. Venez. Cienc. Nat. 11: 49. 1947; Moldenke, Known Geogr. Distrib. Verbenac., ed. 2, 135 & 177. 1949; Moldenke, Phytologia 3: 406—407. 1951; Moldenke, Biol. Abstr. 25: 3050. 1951; Moldenke, Résumé 174 & 443. 1959.

Shrub, 1 m. tall; branches and branchlets slender, light-colored, medullose, obtusely tetragonal, obscurely furfuraceous or stellate-puberulent, becoming glabrate in age; twigs very slender, brown, rather sparsely stellate-tomentellous with light cinereous hair, densest toward the apex; nodes not annulate; principal internodes to 5.5 cm. long; leaves decussate-opposite, subsessile; petioles 1—2 mm. long, stellate-tomentellous; leaf-blades membranous, much lighter beneath, oblong or very slightly oblanceolate, 6—9 cm. long, 1—2 cm. wide, acute or subacuminate at the apex, entire or with a few appressed teeth near the apex, the margins slightly revolute in drying, truncate at the base, glabrous above, stellate-tomentellous on the midrib and larger venation beneath when young, glabrescent in age (sometimes a few stellate hairs on the upper surface, especially along the midrib, when immature); inflorescence supra-axillary, much abbreviated, cymose, the cymes few-flowered; peduncles very slender, about 5 mm. long, densely stellate-tomentellous; inflorescence-branches usually only one pair, very short, densely stellate-tomentellous; bractlets and prophylla minute; calyx about 1 mm. long and wide, very minutely and sparsely stellate-puberulent or glabrate, its rim very shallowly and obscurely 4-toothed; corolla white, its

tube about 2 mm. long, glabrous, its limb 4-lobed, glabrous; stamens exserted.

The type of this species was collected by J. Linsley Gressitt (no. 1168) at Liamui (Leng Mun), on a bank by a small grove, on Hainan Island, at 420 meters altitude, in June or July, 1935, and is deposited in the Langlois Herbarium at the Catholic University of America in Washington. The species is known to me only from the type specimen.

Citations: CHINESE COASTAL ISLANDS: Hainan: Gressitt 1168 (I—type).

CALLICARPA BAVIENSIS Moldenke, Lloydia 13: 205. 1950.

Bibliography: Moldenke, Lloydia 13: 205. 1950; Moldenke, Phytologia 3: 380. 1950; Moldenke, Résumé 175 & 443. 1959.

Shrub; branchlets and twigs slender, obtusely tetragonal, densely sordid-puberulent; nodes often annulate; principal internodes 1—3 cm. long; leaves decussate-opposite; petioles slender, 1—3.5 cm. long, densely puberulent with sordid-yellowish hairs; leaf-blades membranous, dark-green and brunnescent above, lighter beneath, elliptic-ovate or ovate, 4—8.5 cm. long, 2.3—4.3 cm. wide, short-acuminate at the apex, entire, varying from acute to obliquely truncate at the base, minutely puberulous on both surfaces, especially along the larger venation, glabrescent on the lamina between the parts of the larger venation above; midrib slender, plane or slightly prominulous and densely puberulent above, prominulous and densely puberulous beneath; secondaries filiform, 4 or 5 per side, arcuate-ascending, mostly plane above and slightly prominulous beneath; veinlet reticulation rather abundant, sometimes rather conspicuous but plane above and beneath or the many subparallel tertiaries subprominulous; inflorescence axillary, cymose, usually shorter than the subtending petioles, rather few-flowered; peduncles filiform, to 6 mm. long or obsolete, densely puberulent; pedicels filiform, 1—2 mm. long, densely puberulent; bractlets setaceous, about 1 mm. long, densely puberulent; calyx campanulate, about 1 mm. long and wide, more or less puberulent and resinous-punctate, its rim subtruncate, minutely 4-apiculate; corolla infundibular, white, its tube cylindric, 5—6 mm. long, densely resinous-punctate on the outside and microscopically puberulous, its lobes about 1 mm. long, erect, resinous-punctate on the back.

The type of this species was collected by Paul Alfred Pételot (no. 2636) in an open forest at about 600 meters altitude on Mount Bavi, in the province of Sontây, Tonkin, Indochina, on June 4, 1940, and is deposited in the Britton Herbarium at the New York Botanical Garden. The species is known to me thus far only from the type specimen.

Citations: INDOCHINA: Tonkin: Pételot 2636 (N—type).

CALLICARPA BICOLOR A. L. Juss., Ann. Mus. Hist. Nat. Paris 7: 77. 1806 [not C. bicolor Schau., 1886, nor F. Vill., 1845].

Bibliography: A. L. Juss., Ann. Mus. Hist. Nat. Paris 7: 77.

1806; Steud., Nom. Bot., ed. 1, 137. 1821; Spreng. in L., Syst. Veg., ed. 16, 1: 420 (1825) and 5: 126. 1828; D. Dietr., Syn. Pl. 1: 429. 1839; Steud., Nom. Bot., ed. 2, 257. 1840; Walp., Repert. 4: 128. 1845; Schau. in A. DC., Prodr. 11: 642. 1847; Miq., Fl. Ind. Bat. 2: 889. 1856; Bocq., Adansonia 3: [Rev. Verbenac.] 192. 1863; Benth. & Muell., Fl. Austral. 5: 57. 1870; Vidal, Fl. For. Filip. Atlas pl. 74, fig. c. 1883; Rolfe, Journ. Linn. Soc. Lond. Bot. 21: 315. 1884; Jacks. in Hook. f. & Jacks., Ind. Kew. 1: 386. 1893; Briq. in Engl. & Prantl, Nat. Pflanzenfam. 4 (3a): 166. 1895; Koord., Meded. Lands Plant-tuin Buitenz. 19: 558. 1898; E. D. Merr., Philip. Journ. Sci. Bot. 1, Suppl. 1: 121. 1906; H. J. Lam, Verbenac. Malay. Arch. 69 & [361]. 1919; Bakh., Bull. Jard. Bot. Buitenz., ser. 3, 3: 10 & 19—20. 1921; E. D. Merr., Enum. Philip. Flow. Pl. 3: 388—389. 1923; Bakh. in Bakh. & Lam, Nov. Guinea 14, Bot. 1: 167—168. 1924; Stapf, Icon. Bot. Ind. Lond. 1: 525. 1929; Moldenke in Fedde, Repert. Spec. Nov. 40: 99 & 109. 1936; Moldenke, Phytologia 4: 122—124. 1952; Moldenke, Résumé 182, 194, 198, & 443. 1959; Moldenke, Résumé Suppl. 3: 21. 1962; Moldenke, Phytologia 13: 499. 1966.

Illustrations: Vidal, Fl. For. Filip. Atlas pl. 74, fig. c. 1883.

Shrub, about 4 m. tall; stems to 2 cm. in diameter; wood hard; branchlets subferruginous with furfuraceous tomentum, subtomentose, or lightly whitish-tomentose; leaves decussate-opposite; petioles short, subferruginous with furfuraceous tomentum; leaf-blades dark-green, elliptic or elliptic-lanceolate to ovate-lanceolate, almost 10 cm. long, acuminate at the apex, crenate or mucronate-crenate along the margins, cuneate-angustate at the base and attenuate into the petiole, glabrous and shiny above, eglandulose, penninerved, lightly venose-reticulate beneath, softly tomentose or white-tomentose or becoming whitish with stellate-farinaceous dense tomentum beneath; inflorescence dichotomously cymose, solitary, axillary; peduncles equaling or subequaling the petioles; cymes very short, divaricate-dichotomous, corymbose or dichotomously cymose, bipartite, sub-many-flowered, subferruginous with furfuraceous tomentum; flowers very small; calyx short, cupuliform, 1.5 mm. long, subtruncate at the apex; corolla white, sparsely covered with loose hair or subglabrate, sparsely punctate; fruit drupaceous, about the size of a grain of mustard (Sinapis alba), violet, 4-seeded.

The type of this species was collected by Philibert Commerson at Port Praslin on the island of New Britain, Bismark Archipelago, and is deposited in the Jussieu Herbarium at the Muséum National d'Histoire Naturelle in Paris. Sprengel (1825), Dietrich (1839), and Steudel (1840) make the remarkable claim that this species inhabits "Nov. Angl." [=New England, U. S. A.] — what they intended to say was "Nov. Brit." [=New Britain, Melanesia]. Briquet (1895) gives its distribution as "auf den Maskarenen un den Philippinen". Schauer (1847) records it from "ins. Sechelles (ex dict. geogr.)". I have never seen any material of it from the Seychelles nor from the Mascarene Islands and doubt very much if

it occurs there in the wild state.

The species has been found growing in secondary forests and on coral rock, at altitudes to 50 meters abive sea-level, flowering in March, August, and October, and fruiting in October. Ramos & Edaño describe it as an inhabitant of low altitudes. The flowers are described as "white" on Ramos & Edaño s.n. [Hern. Philip. Bur. Sci. 48132] and on Feuilleteau de Bruyn 280, and as "violet" on Ramos & Edaño s.n. [Herb. Philip. Bur. Sci. 49172], but the latter statement may be an error for the fruit-color instead of the flower-color, since the collection is both in flower and fruit.

The C. bicolor of Schauer, referred to in the synonymy above, is a synonym of C. candicans (Burm. f.) Hochr., while that of Fernandez Villar is C. formosana Rolfe. Jackson (1893) reduces "C. bicolor, Juss." to C. cana L. [=C. candicans (Burm. f.) Hochr.] and "C. bicolor, F. Vill." to C. blancoi Rolfe [=C. formosana Rolfe].

Bakhuizen van den Brink (1921) includes C. paucinervia Merr. in the synonymy of C. bicolor, but I regard Merrill's taxon as a variety of C. erioclona Schau. Bentham & Mueller (1870) regard C. bicolor as "precisely the common Archipelago form of C. Cana." Admittedly, C. bicolor is very closely related to both C. candicans and to C. erioclona.

Material has been misidentified and distributed in herbaria under the name of C. cana L. On the other hand, the Kjellberg 96 [Celebes], distributed as C. bicolor, is actually C. candicans, Bish 68 and Elmer 18086 are C. erioclona Schau., and F. L. Stevens 1429 is Buddleia asiatica L. in the Loganiaceae.

Schauer (1847) says of C. bicolor "Proxima C. canae, sed diversa pube alienâ praecipue in foliorum dorso junctâ ut puncta glandulosa neutiquam appareant, et cymis longius pedunculatis bipartitis." He cites Cuming 1283 from the Philippines. Miquel (1856) says "C. canae affinis, tomento distincta" and also cites the same Cuming collection. Bakhuizen van den Brink (1924) cites Feuilleteau de Bruyn 280 from Schouten Island in Dutch New Guinea.

In all, 24 herbarium specimens have been examined by me.

Citations: WESTERN PACIFIC ISLANDS: PHILIPPINE ISLANDS: Alabat: Ramos & Edaño s.n. [Herb. Philip. Bur. Sci. 48132] (Ca--321616). Cebu: J. V. Barrow s.n. [Cebu, 1904] (N); Usteri s.n. [9/XII/02] (N). Luzon: E. D. Merrill 2715 (N), 3442 (N). Mindanao: Ramos & Edaño s.n. [Herb. Philip. Bur. Sci. 49172] (Bz--17263, Ca--324100, N). Negros: E. D. Merrill 207 (Ut--22475). Panay: Martelino & Edaño s.n. [Herb. Philip. Bur. Sci. 35531] (Bz--17461). INDONESIA: GREATER SUNDA ISLANDS: Buton: Kjellberg 96 (Bz--17288, Bz--17289). Celebes: Kjellberg 14 (Bz--17287), 1275 (Bz--17276); Koorders 19490b [3921] (Bz--17283), 19491b [58] (Bz--17284), 19494b [98] (Bz--17285, Bz--17286); Lam 2471 (Bz--17277); Noerkas 422 (Bz--

17278, Bz--17279, Bz--17280). MOLUCCA ISLANDS: Halmahera: Anang 426 (Bz--72770). Ternate: Beguin 1698 (Bz--17459).

CALLICARPA BODINIERI Lévl. in Fedde, Repert. Spec. Nov. 9: 456. 1911.

Synonymy: Callicarpa seguini Lévl. in Fedde, Repert. Spec. Nov. 9: 455--456. 1911. Callicarpa feddei Lévl. in Fedde, Repert. Spec. Nov. 10: 439. 1912. Callicarpa giraldiana var. subcanescens Rehd. in Sarg., Pl. Wils. 3: 368. 1916. Callicarpa grisea Hand.-Mazz., Anz. Akad. Wiss. Wien Math.-nat. 58: 230. 1921. Callicarpa giraldiana subcanescens Rehd. apud Worsdell, Ind. Lond. Suppl. 1: 160. 1941.

Bibliography: Lévl. in Fedde, Repert. Spec. Nov. 9: 455--456 (1911) and 10: 439. 1912; Fedde, Repert. Spec. Nov. Gesamtverz. 58. 1914; Rehd. in Sarg., Pl. Wils. 3: 367 & 368. 1916; Prain, Ind. Kew. Suppl. 5: 43. 1921; Hand.-Mazz., Pl. Nov. Sin. Forts. 14: 4. 1921; Hand.-Mazz., Anz. Akad. Wiss. Wien Math.-nat. 58: 230. 1921; Mottet, Rev. Hort. 94: 390--391. 1923; H. H. Chung, Mem. Sci. Soc. China 1 (1): 226. 1924; Saathoff, Gartenwelt 29: 51. 1925; A. W. Hill, Ind. Kew. Suppl. 7: 36. 1929; P'ei, Mem. Sci. Soc. China 1 (3): 34--37, pl. 2. 1932; Svenson, Brooklyn Bot. Gard. Record 22: 7. 1933; Rehd., Journ. Arnold Arb. 15: 321--323. 1934; Hand.-Mazz., Symb. Sin. 7: 900. 1936; Moldenke in Fedde, Repert. Spec. Nov. 39: 297, 303, & 304 (1936) and 40: 93--96. 1936; Rehd., Journ. Arnold Arb. 18: 243. 1937; Moldenke, Annot. List 108. 1939; Rehd., Man. Cult. Trees, ed. 2, pr. 1, 803, 804, & 932. 1940; Moldenke, Prelim. Alph. List Invalid Names 9--13. 1940; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 1], 56, 71, & 86. 1942; Moldenke, Alph. List Invalid Names 8--11. 1942; Moldenke, Alph. List Cit. 1: 31, 34, & 275. 1946; P'ei, Bot. Bull. Acad. Sin. 1: 3. 1947; Moldenke, Phytologia 2: 342. 1947; Moldenke, Alph. List Invalid Names Suppl. 1: 3. 1947; H. N. & A. L. Moldenke, Pl. Life 2: 50, 58, & 61. 1948; Moldenke, Alph. List Cit. 2: 398, 408, 434, 514, 560, 561, 563, 577, 601, 617, & 618 (1948), 3: 666, 742, 847, & 904 (1949), and 4: 1010, 1018, 1136, 1202, 1243, & 1288. 1949; Rehd., Bibl. Cult. Trees 584. 1949; Moldenke, Known Geogr. Distrib. Verbenac., ed. 2, 130, 156, & 177. 1949; W. J. Bean in Chittenden, Roy. Hort. Soc. Dict. Gard. 1: 358 & 359. 1951; B. C. Blackburn, Trees & Shrubs East. N. Am. 103. 1952; Moldenke, Phytologia 4: 75. 1952; Moldenke, Journ. Calif. Hort. Soc. 15: 80. 1954; Moldenke, Résumé 167, 174, 213, 241, 243--245, 247, & 443. 1959; Krüssmann, Handb. Laubgeh. 1: 254 & 255. 1959; T. H. Everett, New Illustr. Encycl. Gard. 2: 295. 1960; Rehd., Man. Cult. Trees, ed. 2, pr. 9, 803, 804, & 932. 1960; Moldenke, Résumé Suppl. 3: 17, 27, & 30. 1962; Li, Morris Arb. Bull. 14: 3, 4, & 7, fig. 1--4. 1963; Harkness, Phytologia 9: 434. 1964; Moldenke, Résumé Suppl. 13: 6 (1966) and 14: 3, 6, & 7. 1966; G. Grimm, N. Y. Herald Trib., sect. 2, p. 20, Feb. 6. 1966.

Illustrations: P'ei, Mem. Sci. Soc. China 1 (3): pl. 2. 1932; Li, Morris Arb. Bull. 14: 4, fig. 1--4. 1963.

Large woody bush or shrub, 0.9--3 m. tall, or tree to 6.9 m.

tall, the pubescence denser throughout than in var. giraldii; bark gray; branches glabrous and grayish-rose or densely soft-pubescent to glandular-villous at the apex; older branchlets elongate, medullose, cinereous-tomentose or densely soft-pubescent with very short fasciculate hairs, the younger ones farinose or scurfy-pubescent; leaves decussate-opposite, petiolate, dull; petioles cylindric, 0.5--3.5 cm. long, sharply sulcate, densely pubescent or puberulent-tomentellous; leaf-blades chartaceous or herbaceous, comparatively narrow, varying from elliptic or broadly elliptic, elliptic-oblong, elliptic-lanceolate, or lanceolate to oblong-elliptic, oblong-lanceolate, ovate-lanceolate, ovate, or obovate, 5--18 cm. long, 2.5--8 cm. wide, attenuate or sometimes acuminate at both ends or acute to acuminate, narrowly cuspidate, or even obtuse at the apex, gradually or abruptly contracted at the cuneate or broadly cuneate base into the petiole, closely denticulate, dentate, or densely and broadly mucronulate-denticulate along the margins, brownish-green or rubescent above and glabrous or sparsely pubescent to almost calvescent, fulvous and reticulate beneath and softly stellate-pubescent to densely short-tomentose or villous with rather long fascicled hairs throughout, also marked with pale-yellow scutelliform glands beneath; midrib impressed above; secondaries 6--9 per side, flexuous-arcuate or oblique, branched, free, pubescent; tertiaries often loosely reticulate, prominent beneath; inflorescence corymbose, densely pubescent or densely tomentose throughout; peduncles slender, 4--10 mm. long, as long as or shorter than the petioles, puberulent-tomentellous or pubescent; cymes axillary, 1/5 as long as the subtending leaves, dense, dichotomous or decompositе, many-flowered, 1.5--2 cm. long, 2--4 cm. wide, often very dense and irregular; pedicels puberulent-tomentellous; bractlets linear, to 4 mm. long; flowers fragrant; calyx cupuliform or turbinate, about 1 mm. long, subsessile, pilosulous or minutely hirtellous to densely pubescent on the outer surface, subglabrous within, the rim minutely 4-toothed with broad and obtuse or rather obtuse teeth; corolla infundibular, pink to pinkish, lilac-pink, rose, red, purple, reddish-blue, or white, 2--2.5 mm. long, nearly equal, densely pubescent or pilosulous to glabrate or glabrous outside, glabrous within, the limb slightly longer than the tube, the lobes 1/3 the length of the limb, ovate, obtuse at the apex; stamens exserted or long-exserted, to 7 mm. long; filaments glabrous; anthers oblong or broadly elliptic, 0.6 mm. long, opening by longitudinal slits, the connective sparsely and minutely glandular on the back; style glabrous, varying from shorter than to equaling or surpassing the stamens, filiform, emarginate or bifid at the apex; ovary densely pubescent with stellate hairs; fruit very small, globose, 3--4 mm. wide, blackish-blue or violet to purplish, purple, or bright-purple, yellow when immature, pubescent.

This species was based by Léveillé on a collection made by Léon François Martin (no. 2365) in the environs of Gan-Pin on June 19, 1898, one by Léon François Martin and Emile Marie Bodinier (no.

1996) from among rocks at Grandes Rocailles on October 28, 1897, and one by Pierre Julien Cavalerie (no. 1905) from Pin-Fa on June 23, 1903, all in Kweichow, China. The type of C. seguini was collected by Pierre Julien Cavalerie (no. 2341) in the environs of Tou-chou, Kweichow, China, in May, 1898, and is deposited in the Bodinier Herbarium. The type of C. feddei was collected by Joseph Henri Esquirol (no. 468) at Kouy-Tchéou, Kweichow, China, in June of 1905. The type of C. giraldiana var. subcanescens was gathered by Augustine Henry (no. 5864) without precise locality in western Hupeh, China, and is deposited in the herbarium of the Arnold Arboretum at Cambridge, Massachusetts. The type of C. grisea was gathered by Wang-Te-Hui [distributed as Handel-Mazzetti 182] around the coal mines at Pinghsiang, at 600 meters altitude, in western Kiangsi, China, in 1920.

P'ei (1932) includes C. lyi Lévl. in the synonymy of C. bodinieri, but I regard this as a distinct variety, C. bodinieri var. lyi (Lévl.) Rehd. Rehder (1949) cites the original publication of C. feddei erroneously to page "320" instead of 439, and in his 1934 publication places C. grisea in the synonymy of C. bodinieri var. lyi.

The species has been found growing on slopes and hillsides, along roadsides, and in meadows, thickets, open thickets, and swamps, sometimes in clay soil, at altitudes of 200 to 2300 meters, flowering from May to September, and fruiting in February and June to October. Ching calls it "rare" in Kwangsi; Wilson says that it is "not common" in Kiangsi; Tsang refers to it as "scattered" or "fairly common" in Kwangsi. Yin describes the flowers as "in spikes", which, of course, is quite erroneous. The flowers are described as "pink" on Bullock 197, Ching 5365, and Tsang 27835 & 28380; "pinkish" on Keng 595; "purple" on A. Henry 12119 and Yin 102; "reddish-blue" on Tsang 27740; "white and rose" on Handel-Mazzetti 8691; and "white" on Chung & Sun 298.

Li (1963) says that "The species is native to central and western China. It grows in thickets of the hilly districts but does not seem to be common. It flowers from July to September and fruits in September and October. The species is readily distinguished by the dentate margins of the leaves."

Rehder (1934) says "Callicarpa bodinieri is the oldest name for that very variable species generally known as C. Giraldiana and agrees with its pubescent form described as var. subcanescens. The type of the latter is slightly more pubescent than Bodinier's no. 2365, one of the syntypes of C. Bodinieri and that which should be considered the type (lectotype) of the species because it is from Bodinier's herbarium and is represented by ample flowering material, while no. 1996 is in fruit; the third syntype was collected by Cavalerie and has the older leaves glabrescent, approaching those of var. Giraldii. Callicarpa Feddei hardly differs from the type ex-

cept that the leaves are narrower and smaller. The type of C. Giraldiana var. subcanescens is somewhat more densely pubescent and agrees in this respect with C. Seguini. It seems hardly possible to draw a clear line between the pubescent type and the glabrescent var. Giraldii, since they are connected by intermediate forms; the densely pubescent var. Lyi is more distinct particularly in its pubescent corolla."

Léveillé's original description of C. seguini is "Affinis C. rubellae a quo differt foliis conspicue petiolatis; affinis etiam C. Chaffanjoni a quo differt foliis subtus breviter sed dense tomentosis et inflorescentia tota tomentosa." His original description of C. bodinieri is "Rami glabri, apice glanduloso-villosi; frutex magna; folia 12 x 4 cm. conferte denticulata ovata utrinque attemuata petiolata supra rubescentia subtus villoso reticulata; flores in cymas axillares, dichotomas, quintam folii partem aequantes dispositi; sepala et petala pilosula; stamina exserta; stylus breviter emarginatus staminibus aequalis; fructus minimi jucunde violacei." His description of C. feddei is "Rami griseo-rosei; folia ovato-lanceolata acuminata, in petiolum sensim vel abrupte contracta denticulata, supra glabra, brunneo-viridia subtus fulva, nervis flexuoso-arcuatis, ramosis, pubescentia; petioli pedunculi et pedicelli puberulo-tomentelli; inflorescentiae corymbosae; flores rubri; calice minimo hirtello, cupuliformi; corolla glablata; stamina longe exserta, stylo tamen filiformi et apice bifido breviora."

Rehder (1916) distinguished his C. giraldiana var. subcanescens from what be now call C. bodinieri var. giraldii as follows: "A typo recedit indumento omnium partium densiore, ramulis junioribus pube farinoso fasciculato-piloso obtectis, foliis supra sparse et minute fasciculato-pilosis subtus densius praecipue in nervis et venulis fasciculato-pilosis, cymis et calycibus densius fasciculato-pilosis.....This variety differs from the type in the denser pubescence of all its parts; the leaves are loosely covered on the whole under surface with rather long fascicled hairs. The leaves of Henry's specimens are comparatively narrow, elliptic-oblong to elliptic-lanceolate, the larger ones not exceeding 3.5 cm. in width, while those of Wilson's No. 1528 are mostly elliptic or obovate and up to 6 cm. broad."

Handel-Mazzetti's original description of C. grisea is "Frutex (?) ramis hornotinis elongatis medullosis, totus pilis fasciculatis brevissimis cinereo-tomentosus, foliis subtus praeterea glandulis scutellatis pallide luteis adspersis supra tantum calvescentibus. Folia oblonga-elliptica 1.5--16 cm. lg. et sub 2--3 plo. angustiora acuta vel anguste cuspidata (vel obtusa), basi contracta et in petiolum 10--35 mm. lg. argute sulcatum longe decurrentia, dense et late mucronulato-denticulata, herbacea, costa supra impressa cum nervis 6--9 nis obliquis arcuatis liberis et trabeculis crebris et saepe venis laxe reticulatis subtus prominua. Cymae axillares decompositae myrianthae, pedunculis tenuibus usque ad 1 cm. lgis.,

1.5--2 cm. lg. 3--4 cm. lt. densissimae irregulares. Bracteae ad 4 mm. usque lg. lineares. Calyx subsessilis turbinatus 1 mm. lg. intus glaber dentibus brevissimis latis obtusiusculis. Corolla rosea 2--2.5 mm. lg. infundibularis intus et tubo extus glabra, limbo paulo longiore ad 1/3 in lobos ovato ubtuso fisso. Stamina ad 5 mm. lg. antheris 2/3 mm. lgis. late ellipticis dorso parce et minute glandulosis, rima longitudinali dehiscentibus.....Floribus C. Americanae et longifoliae et ningpoënsis, sed indumento peculiaris."

Li (1963) distinguishes this taxon from its immediate relatives in popular cultivation as follows: On vegetative characters --

1. Leaves long-petiolate, the petioles 1--3 cm. long or about 1/3 to 1/5 the length of the crenate-serrate blades.C. americana.
1a. Leaves short-petiolate, the petioles 2--15 mm. long or about 1/5 to 1/20 the length of the serrate or s errulate to dentate or denticulate blades.
  2. Leaf-base narrowly wedge-shaped, the blades glabrous to pubescent beneath.
    3. Leaf-blades glabrous or nearly so, the margins serrate to serrulate more or less toward the central part only.
      4. Leaf-blades elliptic or obovate, smaller, about 1.5--3 cm. (rarely to 5 cm. or more) long, acuminate at the apex.....C. dichotoma.
      4a. Leaf-blades elliptic or ovate-lanceolate, larger and narrower, about 2.5--6 cm. (sometimes to 12 cm.) long, long-acuminate at the apex.....C. japonica.
    3a. Leaf-blades pubescent on both surfaces, the margins dentate to denticulate or crenate-denticulate throughout the whole length.....C. bodinieri.
  2a. Leaf-bases rounded or subrounded; leaf-blades thickly stellate-tomentose beneath.....C. mollis.

On reproductive characters he distinguishes the same taxa as follows:

1. Flowers and fruit-clusters sessile or subsessile..C. americana.
1a. Flower- and fruit-clusters pedunculate.
  2. Flower- and fruit-clusters glabrous; peduncles longer than the petioles.
    3. Fruit smaller, about 3--4 mm. wide; anthers opening by a slit; inflorescence generally supra-axillary.C. dichotoma.
    3a. Fruit larger, about 4--5 mm. wide; anthers opening by a terminal pore; inflorescence axillary.....C. japonica.
  2a. Flower- and fruit-clusters pubescent; peduncles about as long as the petioles.
    4. Fruit bright-purple, about 3--4 mm. wide; flowers lilac, the stamens exserted.....C. bodinieri.
    4a. Fruit dull-purple, about 5 mm. wide; flowers light purplish-rose, the stamens included.....C. mollis.

Material of C. bodinieri has been misidentified and distributed in herbaria under the names C. bodinieri giraldii (Hesse) Rehd.,

C. giraldiana Hesse, C. giraldii Hesse, C. japonica Thunb., and C. longifolia Lam. On the other hand, the E. H. Wilson 1164 and Herb. Univ. Nanking 1095, distributed as C. bodinieri, are actually var. giraldii (Hesse) Rehd., while Fang 2529 is C. japonica var. angustata Rehd.

P'ei (1947) records C. bodinieri from Sikang. In his 1932 work he cites the following: CHINA: Honan: L. H. Bailey s.n. [Chikung-shan, June 1917]. Hupeh: A. Henry 5864. Kiangsi: Wang-Te-Hui 182 (A), 364. Kweichow: Cavalerie 2341 (Ed); Esquirol 468 (Ed); L. F. Martin 2365 (Ed). The Cavalerie 1026 which he also cites is C. bodinieri var. lyi (Lévl.) Rehd. He regards E. H. Wilson 1319 and A. Henry 12119 as var. giraldii (Hesse) Rehd.

In all, 54 herbarium specimens and 10 mounted photographs, including type or phototype material of several of the names involved, have been examined by me.

Citations: CHINA: Anhwei: R. C. Ching 3204 (Ca--348070). Chekiang: Chiao 1046 [Herb. Univ. Nanking 15345] (Ca--325372); Keng 595 (Ca--361626). Fukien: H. H. Chung 2145 (Ca--420358). Hupeh: Chun & Chien 5090 [Herb. Univ. Nanking 8065] (Ca--261516); A. Henry 1185 (W--800128), 3017 (N), 3999 (W--800731); E. H. Wilson 439a (W--777044), 1319 (N, W--596743), 2196 (W--777382), 2213 (N), 2443 (N). Kiangsi: Bullock 197 (N), s.n. [Kuikiang] (N); Chung & Sun 252 (N), 298 (N), 616 (N), 632 (N); Ip 1809 (Ph); Wang-Te-Hui 182 (N--photo); E. H. Wilson 1528 (N--photo, W--777228). Kwangsi: R. C. Ching 5365 (N); Steward & Cheo 451 (Bz--17486, N); Tsang 27740 (W--1757182), 27835 (W--1757260), 27963 (W--1757361), 28380 (W--1757681). Kwangtung: Tak & Chow 2788 [Herb. Canton Chr. Coll. 14649] (Ca--319413). Kweichow: Steward, Chiao, & Cheo 565 (N, S, W--1598884); Tsiang 5453 (S). Szechuan: Fang 1235 (N), 4648 (N, W--1626995), 5719 (N), 8402 (N); Yin 102 (N). Yünnan: Forrest 12074 (S); Handel-Mazzetti 8691 [Diar. 1664] (W--1607241); A. Henry 12119 (N, N), 12119a (W--458868), 12119c (N); J. F. Rock 2523 (W--1213141). CULTIVATED: Germany: Herb. Hort. Berol. s.n. [Sept. 1842] (B), s.n. [July 1845] (B), s.n. [Oct. 1846] (B, E--photo, N--photo, Z--photo), s.n. (B, B, B, N--photo, Z--photo); Herb. Link s.n. (B, N--photo, S--photo, Z--photo).

CALLICARPA BODINIERI var. GIRALDII (Hesse) Rehd., Journ. Arnold Arb. 15: 322. 1934.

Additional & emended synonymy: Callicarpa giraldiana Hort. ex C. K. Schneid., Ill. Handb. Laubholzk. 2: 1048, nom. nud. 1912. Callicarpa giraldiana Hesse, Mitt. Deutsch. Dendrol. Gesell. 21: 366, hyponym. 1912. Callicarpa giraldii Hesse ex Rehd. in L. H. Bailey, Stand. Cycl. Hort. 2: 628 & 629. 1914. Callicarpa longifolia Hemsl. apud Rehd. in Sarg., Pl. Wils. 3: 306, in syn.(in

part). 1916 [not C. longifolia Benth., 1966, nor Blume, 1936, nor Hance, 1932, nor Hook., 1932, nor L., 1820, nor Lam., 1783, nor Roxb., 1827, nor Vahl, 1936]. Callicarpa longifolia Diels apud Stapf in Curtis, Bot. Mag. 142: pl. 8682, in syn. (in part). 1916. Callicarpa mairei Lévl., Sert. Yunnan. 2. 1916. Callicarpa arnoldiana Kelsey, Aristocrats for the Garden 37, nom. nud. 1932. Callicarpa bodinieri var. giraldii (Rehd.) Rehd. ex Moldenke in Fedde, Repert. Spec. Nov. 40: 93, in syn. 1936; Rehd., Journ. Arnold Arb. 18: 243. 1937. Callicarpa giraldii Rehd. ex Moldenke in Fedde, Repert. Spec. Nov. 40: 93, in syn. 1936; Prelim. Alph. List Invalid Names 10, in syn. 1940. Callicarpa bodinieri giraldii (Hesse) Rehd. ex T. H. Everett, N. Y. Bot. Gard. Seed Exch. List 1951: 5. 1950. Callicarpa bodinieri giraldi Mattoon, Pl. Buyers Guide, ed. 6, 83. 1958. Callicarpa giraldiana Pamp. ex Moldenke, Résumé 243, in syn. 1959. Callicarpa bodenieri giraldi Rehd. ex Kelsey Nursery Service, Short Guide Cat. 167: 25. 1961. Callicarpa bodinieri var. giraldiana (Hesse) Rehd. ex Li, Morris Arb. Bull. 14: 7, in syn. 1963. Callicarpa bodinieri giraldi Grimm, N. Y. Herald Trib., sect. 2, p. 20, February 6. 1966.

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35. 1939; Moldenke, Annot. & Classif. List 108. 1939; Moldenke, Prelim. Alph. List Invalid Names 9--11. 1940; Rehd., Man. Cult. Trees, ed. 2, pr. 1, 804 & 932. 1940; Doney, Brooklyn Bot. Gard. Record 30: 23. 1941; Hottes, Book Shrubs, ed. 4, 168. 1942; Moldenke, Known Geogr. Distrib. Verbenac., ed. 1, 56, 58, 71, & 86. 1942; Moldenke, Alph. List Invalid Names 8--10. 1942; Moldenke, Alph. List Cit. 1: 31, 34, & 275. 1946; P'ei, Bot. Bull. Acad. Sin. 1: 3. 1947; Moldenke, Alph. List Invalid Names Suppl. 1: 3. 1947; H. N. & A. L. Moldenke, Pl. Life 2: 61. 1948; Moldenke, Alph. List Cit. 2: 398, 408, 434, 514, 563, 601, 617, & 618. (1948), 3: 666, 742, 847, & 904 (1949), and 4: 1010, 1018, 1136, 1202, 1243, & 1288. 1949; Rehd., Bibl. Cult. Trees 584. 1949; Moldenke, Known Geogr. Distrib. Verbenac., ed. 2, 130, 135, 156, & 177. 1949; T. H. Everett, N. Y. Bot. Gard. Seed Exch. List 1951: 5. 1950; McEacharn, List Seeds Villa Taranta Gard. 8: 8. 1950; W. J. Bean, Trees & Shrubs Hardy Brit. Isles, ed. 7, 1: 333. 1950; T. H. Everett, N. Y. Bot. Gard. Seed Exch. List 1952: 5. 1951; W. J. Bean in Chittenden, Roy. Hort. Soc. Dict. Gard. 1: 358 & 359. 1951; B. C. Blackburn, Trees & Shrubs East. N. Am. 103. 1952; Moldenke, Journ. Calif. Hort. Soc. 15: 80, 1954; Mattoon, Pl. Buyers Guide, ed. 6, 83. 1958; Krüssmann, Handb. Laubgeh. 1: 254. 1959; Moldenke, Résumé 167, 174, 213, 241, 243, 244, & 443. 1959; Rehd., Man. Cult. Trees, ed. 2, pr. 9, 804 & 932. 1960; Moldenke, Résumé Suppl. 3: 27 & 30. 1962; Li, Morris Arb. Bull. 14: 3, 4, & 7, fig. 1—5 & 7. 1963; Harkness, Phytologia 9: 434. 1964; Anon., Ind. Sem. Stich. Koninkl. Rotterdam. Dierg. [6]. 1965; G. Grimm, N. Y. Herald Trib., sect. 2, p. 20, February 6. 1966; Moldenke, Résumé Suppl. 13: 6 (1966) and 14: 6 & 7. 1966.

Illustrations: Hesse, Mitt. Deutsch. Dendrol. Gesell. 21: 368 & 369. 1912; Stapf in Curtis, Bot. Mag. 142: pl. 8682 [in color]. 1916; Mottet, Rev. Hort. 94: opp. 390 [in color]. 1923; Stipp, Gartenwelt 29: 51. 1925; Leray, Rev. Hort. 97: 416 [in color]. 1925; Patermann, Beitr. Zytol. Verbenac. pl. 3, fig. 23—27, & pl. 5, fig. 6 & 7. 1935; Silva Tarouca & Schneid., Insere Freiland-Laubgehölze, ed. 3, 111. 1931; Li, Morris Arb. Bull. 14: 4 & 7, fig. 1—5 & 7. 1963.

This variety differs from the typical form of the species in having its leaf-blades glabrous above and sparingly fasciculate-pubescent and glandulose beneath and the cymes less pubescent. The leaf-blades, especially the older ones, are densely scaly beneath with resinous golden scales, which are hidden on more densely stellate-pubescent leaves.

Recent collectors describe this plant as a small woody or bushy slender shrub, 0.3—8 m. tall, a bush, a much-branched herb, or even a tree to 5 m. tall, whitish-gray in aspect; branches few; stems purplish-chocolate, to 6 inches in diameter; petioles "tufted deep purplish above"; leaf-blades light or dull-green above, pale or pale-green beneath; peduncles purple; flowers small, purple in bud; corolla pink, pinkish, purplish-pink, or greenish-pink to pinkish-purple, rose-purple, reddish-purple, purple, red, or even "yellow"; fruit green or greenish-blue to violet or even white, very showy.

This plant has been found growing in sandy soil, in partial or dense shade, in woods and thickets, open woods and open thickets, on hillsides and grassy hillsides, on riverbanks and brushy slopes, and along roadsides and streamsides, from 230 to 3300 meters altitude, blooming in February, May to August, and October, and fruiting from July to November. Wilson records it as "common" in Kiangsi; Tsang calls it "fairly common as scattered shrubs in dry silt" in Kwangtung; Chin calls it "common" in Anhwei, while Ching refers to it as "rare" in the same province. Ching likewise describes it as both "common" and "rare" in Chekiang and as a "fairly common shrub in thickets" in Kwangsi; Ching & Tso refer to it as both "common" and "rare" in Kiangsu.

Hancock says "clusters [of fruit] white at time of collecting, considered of ornamental value". It these fruits are mature, his collection may well represent a white-fruited form worthy of nomenclatural recognition on a par with the white-fruited form of C. americana L., C. dichotoma (Lour.) K. Koch, and C. japonica Thunb. Ching [on no. 3634] describes the flowers as purple, but doubtless intended this description to apply to the fruit, since his collection is only in the fruiting stage; but the flowers are also described as "purple" on Hu 1621 and on Rock 9195. They are described as "pink" on Hu 284, "pinkish" on Ling 1243, "pinkish-purple" on Chun 3593, "reddish-purple" on Chung & Sun 204, "rose-purple" on Wilson 1531, "purplish-pink" on Ching & Tso 1318, "greenish-pink" on Ling 2565, "red" on Tsang 100, and "yellow" on E. H. Wilson 1319.

Rehder (1916), in speaking of what he then called C. giraldiana, says "This species seems to be most closely related to C. formosana Rolfe and C. japonica Thunberg; the first is easily distinguished by the denser pubescence, the longer peduncles which exceed the petioles, and by the rounded or obtuse base of the leaves; C. japonica differs in its glabrous narrower leaves, smaller glabrous inflorescence on a peduncle almost as long as the petiole and in its longer anthers opening at the apex with a pore. It is also near the Indian C. psilocalyx Clarke, which differs chiefly in its densely pubescent branchlets, in its long-acuminate leaves usually obtuse or rounded at the base, shorter petioles, smaller inflorescence, and in the filaments scarcely exceeding the corolla-lobes. Wilson's Nos. 439, 439e, 2193 and 2496, Giraldi's Nos. 1360, 1361 and 5896 and Henry's No. 5992 agree very well with the specimens from Hesse's nursery, which must be considered the type of this species. Hesse's plants were raised from seed sent by Giraldi from Shensi. Most of the other specimens are more glabrescent and some fruiting specimens with rather narrower leaves may belong to C. japonica, but without flowers their position remains uncertain. Von Rosthorn's No. 1896 is more pubescent and approaches var. subcanescens." He cites, from the Arnold Arboretum herbarium, the following: CHINA: Hupeh: A. Henry 3107, 5864, 5992, 7312, 7497; Silvestri 1948, 1950, 1952, 1953, 3158; E. H.

Wilson 439, 439a, 2193, 2196. Kiangsi: E. H. Wilson 1531. Shensi: Giraldi 1360, 1361, 5896, s.n. [Tu-kia-po, October 1897]. Szechuan: Von Rosthorn 1896, E. H. Wilson 2194, 5100. Yünnan: A. Henry 12119, 12119a, 12119c. CHINESE COASTAL ISLANDS: Hainan: A. Henry 6127. CULTIVATED: Germany: Hesse s.n. [Weener, August and October, 1910]; Kache s.n. [Weener, July and October, 1912]; Rehder s.n. [Weener, July 1911]. The A. Henry 12119, 12119a, & 12119c and E. H. Wilson 439a & 2196 which he cites I regard as typical C. bodinieri.

P'ei (1932), also speaking of C. giraldiana, says: "This species is allied to Callicarpa formosana Rolfe, and C. longifolia Lam. It differs from the former by its short peduncles which does not exceed the petiole, and in the leaves not being densely pubescent; and from the latter by its larger flowers, scarlet glands and relatively broader ovate leaves."

Li (1963) says that this variety "is native to central, western and southern China. It has not only a wider range than the typical C. Bodinieri but it is also a more common plant. In cultivation, it is also a commoner and more ornamental plant. It was first introduced into the western garden in 1900.....[It] differs in the leaves being glabrous above and only sparingly pubescent beneath. The inflorescence is also less pubescent. The teeth along the leaf margins are crenate-denticulate and not distinctly dentate as in the typical form."

The C. longifolia of Bentham and of Hance, referred to in the synonymy above, belong to the synonymy of C. longissima (Hemsl.) Merr.; that of Blume, Linnaeus, Roxburgh, and Vahl is C. longifolia Lam.; that of Hooker is C. brevipes (Benth.) Hance; and that of Hemsley and of Diels is in part C. japonica var. angustata Rehd. The Leray (1925) reference given in the bibliography above is sometimes incorrectly written "96: 416."

In cultivation, according to Rehder (1940), C. bodinieri var. giraldii blooms from July to September and fruits in September and October. He avers that it was introduced into cultivation in 1900 [actually, however, in 1848!] and that it will grow well in life zone V in the United States. Bean (1951) claims that it was introduced in 1907. Vernacular names recorded for it are "beauty berry" and "lo hai ngan". Junell (1934) discusses its gynoecium morphology, Schwenke (1931) discusses the cytology, while Patermann (1935) discusses the pollen and embryo cytology.

Bailey (1935) says that C. arnoldiana is offered to the horticultural trade by H. P. Kelsey, East Boxford, Massachusetts, and C. giraldiana by Brooklyn Botanic Garden, Sanford, LaMac Nurseries (Hampton, Virginia), Royal Botanic Gardens (Kew, England), Reginald Kaye (Silverdale, Lancaster, England), and Knapp Hill Nursery (Woking, Surrey, England). The Kelsey Nursery Service (1961) offers 2 1/2 inch potted plants at the rate of 2 for $3 or 10 for $8.50. Mattoon (1958) lists ten sources.

Material of C. bodinieri var. giraldii has been misidentified and distributed in herbaria under the names C. dichotoma (Lour.) K. Koch, C. dichotoma (Lour.) Raeusch., C. formosana Rolfe, C. giraldiana var. subcanescens Rehd., C. japonica L. f., C. japonica Thunb., C. japonica var. luxurians Rehd., C. longifolia Lam., C. rubella Lindl., and C. sinensis Hort.

On the other hand, the R. C. Ching 3204 & 5365, Chung 2145, Fang 4648 & 8402, A. Henry 12119a, Herb. Univ. Nanking 1095, Ip 1809, J. F. C. Rock 2523, Steward, Chiao, & Cheo 565, and E. H. Wilson 439a, 1319, & 2196, distributed as C. bodinieri var. giraldii, are all typical C. bodinieri Lévl.; W. Y. Chun 240 [Herb. Univ. Nanking 5646] & s.n. [Herb. Univ. Nanking 5805] are C. candicans var. sumatrana (Miq.) Moldenke; Chang & Metcalf 197 & 216, R. C. Ching 1838, H. H. Chung 2314, 2677, & 3021, and Herb. Canton Chr. Coll. 12008 are C. formosana Rolfe; Chiao s.n. [Herb. Univ. Nanking 18896] is C. japonica Thunb.; Barchet 557, Fang 2529, Herb. Canton Chr. Coll. 12677, How 71071, T. C. Lee 3735, C. O. Levine s.n. [Herb. Canton Chr. Coll. 1751 & 3353], E. D. Merrill 11112, and E. H. Wilson 1342, 1531, & 2193 are all C. japonica var. angustata Rehd.; J. F. C. Rock 9195 and E. H. Wilson 439 are C. japonica var. rhombifolia H. J. Lam; Herb. Canton Chr. Coll. 12560 and Peng, Tak, & Kin 561 are C. longipes Dunn; and Tak 850 [Herb. Lingnan Univ. 16349] is a cotype collection of C. rubella f. robusta P'ei.

P'ei (1932) cites the following additional specimens: CHINA: Anhwei: Chin 2761, Ching 2290. Chekiang: Cheo & Wilson s.n. [Mokan-shan, July 1926], Chiao 1046, R. C. Ching 3634, 4927, 4987, Macgregor s.n. [Vicinity of Ningpoo, 1908], Tang & Haia 340. Fukien: Chen 3080. Honan: Hers 2574. Hupeh: Chun 3620, 3682, 4392, A. Henry 3107, 7497, 71117, K. Ling s.n. [Ichang, 1926], Silvestri 1948, 1950, 1952, 3158, E. H. Wilson 2193. Kiangsi: Hu 284, Ip s.n. [Lushan, June 1922], Wang-Te-Hui 224, E. H. Wilson 1531. Kiangsu: R. C. Ching 4863, 4872, Ching & Tso 598, 650, 1310, 1318, Chun 2000, "ex N. 1095", Hancock s.n. [Shanghai, Sept. 1925]. Kwangsi: R. C. Ching 6394. Kwangtung: "ex C.1751, 3353", A. Henry 6127. Kweichow: Handel-Mazzetti 2054. Shensi: Giraldi s.n. [Kingua-shan, July 1897]. Szechuan: Bock & Von Rosthorn s.n. [1896], W. P. Fang 2061, 6423, E. H. Wilson 2194, 5100. THIBET: Forrest 19246, 19264. The R. C. Ching 3204, J. F. C. Rock 2523, and E. H. Wilson 1319, which he cites, are regarded by me as typical C. bodinieri Lévl., and the Barchet 557, which he cites, I regard as C. japonica var. angustata Rehd.

In all, 96 herbarium specimens, including type material of most of the names involved, and 13 mounted photographs have been exam-

ined by me.

Additional citations: CHINA: Anhwei: Cheng 4008 (W--1674272); K. Ling 1127 [Herb. Univ. Nanking 7717] (Ca--258805), 1243 [Herb. Univ. Nanking 7794] (Ca--259031); Sun 1176 (N), 1260 (N). Chekiang: Cheo & Wilson 107 [Herb. Univ. Nanking 12753] (Ca--316400), s.n. [Herb. Univ. Nanking 12753] (Ca--354682); Chiao 1022 [Herb. Univ. Nanking 14321] (Ca--325396), s.n. [Herb. Univ. Nanking 14321] (W--1426777); R. C. Ching 1652 (Ca--281671, W--1246536), 3634 (Ca--343153); Hu 1621 (Ca--362323); E. D. Merrill 11298 (Ca--992129, N). Fukien: C. H. Cheng 3080 (Ca--299362); L. Y. Tai 11793 (Ca--325796). Hupeh: Y. Chen 736 [Herb. Univ. Nanking 15086] (Ca--343481), 2009 [Herb. Univ. Nanking 15303] (Ca--343537); Chow 595 (N), 766 (N), 1570 (N), 1805 (N); W. Y. Chun 3593 (W--1506373), 3965 (W--1279530), 4024 (W--1279531), 4320 (Gg--234244); A. Henry 5992 (W--801488), 7312 (W--598666); E. H. Wilson 439 (Gg--31995, Gg--31997), 439a (Gg--36135), 1164 (N, W--596841), 2196 (Gg--31996). Kiangsi: Chung & Sun 204 (N); Tsiang 10054 (N). Kiangsu: M. L. Hancock s.n. [Herb. Univ. Nanking 12075] (Ca--294849); Herb. Univ. Nanking 1095 (Ca--230385, Io--114023, W--1279692); Keng 1728 (N); K. Ling 2565 [Herb. Univ. Nanking 12515] (Ca--316400); Shan 1095 (Mv). Kwangsi: R. C. Ching 5365 (N), 5666 (N), 6394 (N, W--1248674). Kwangtung: Peng, Tak, & Kin 678 [Herb. Canton Chr. Coll. 12677] (Ca--275059); Tsang 20717 (B, Bz--17603, N), 20797 (N). Kweichow: Steward, Chiao, & Cheo 565 (N). Shensi: Giraldi s.n. [Monte Kin-qua-san, 10.VII.1897] (Ca--348200--isotype). Szechuan: W. P. Fang 2529 (N), 4648 (Du--252638, N), 8402 (Du--252693, N). Yunnan: J. F. C. Rock 11579 (Ca--327307, W--1332125). Province undetermined: W. T. Tsang 850 [Herb. Lingnan Univ. 16349] (I). CHINESE COASTAL ISLANDS: Hainan: How 71071 (B, N); W. T. Tsang 100 [Herb. Lingnan Univ. 15599] (N, S, W--1248845). JAPAN: Enoshima: Sawada s.n. [Province Sagami] (Ca--382277). CULTIVATED: California: McClintock s.n. [Nov. 16, 1959] (Gg--418849, Gg--418850). Germany: Herb. Kummer s.n. [Hort. Bot. Monac., Aug. 1848] (Mu--1440, N--photo, Z--photo), s.n. [Hort. Bot. Monac., 20. X.1855] (Mu--1441), s.n. [Hort. Bot. Monac., 15.VII.1864] (Mu--1439, N--photo, Z--photo); K. Koch s.n. (B, N--photo, Z--photo). Massachusetts: E. J. Palmer 6712-1 (N); Rehder s.n. [Wilson 439 seed] (Ur); C. K. Schneider s.n. [Wilson 633 seed] (Ar--19786). MOUNTED ILLUSTRATIONS: Hesse, Seite 98 (Cp); Stapf in Curtis, Bot. Mag. 142: pl. 8682. 1916 (Cp, Oa).

CALLICARPA BODINIERI var. LYI (Lévl.) Rehd., Journ. Arnold Arb. 18: 243. 1937.

Synonymy: Callicarpa lyi Lévl. in Fedde, Repert. Spec. Nov. 10: 439. 1912.

Bibliography: Lévl. in Fedde, Repert. Spec. Nov. 10: 439. 1912; Fedde, Repert. Spec. Nov. Gesamtverz. 58. 1914; Lévl., Fl. Kouy-Tchéou 439. 1915; Prain, Ind. Kew. Suppl. 5: 43. 1921; P'ei, Mem. Sci. Soc. China 1 (3): [Verbenac. China] 35. 1932; Rehd., Journ. Arnold Arb. 15: 322. 1934; Moldenke in Fedde, Repert. Spec. Nov. 40: 95. 1936; Rehd., Journ. Arnold. Arb. 18: 243. 1937; Moldenke, Prelim. Alph. List Invalid Names 12. 1940; Moldenke, Known Geogr. Distrib. Verbenac., ed. 1, 56 & 86. 1942; Moldenke, Alph. List Invalid Names 10. 1942; Moldenke, Known Geogr. Distrib. Verbenac., ed. 2, 130 & 177. 1949; Moldenke, Phytologia 4: 75. 1952; Moldenke, Résumé 167, 245, & 443. 1959.

Rehder (1934) says of this taxon: "This at first glance looks like a distinct species with the grayish white tomentum of the under side of the leaves, of the stem and the inflorescence including the calyx and corolla, but in all other characters it agrees with typical C. Bodinieri. By P'ei it is referred to C. Giraldiana var. subcanescens as a synonym, but is easily distinguished by the much denser whitish pubescence, particularly the upper part of the corolla is fairly densely pubescent outside, while in the type only scattered stellate hairs are present or often entirely lacking."

Recent collectors describe the plant as a shrub, 5 feet tall, with purple-red flowers, growing on brushy slopes, at 720 meters altitude, fruiting in June and July.

The type of the variety was collected by Pierre Julien Cavalerie (no. 1026) at Pin-Fa, Kweichow, China, on June 3, 1903, and is deposited in the herbarium of the Royal Botanic Garden at Edinburgh. P'ei (1932) regards it as typical C. bodinieri (which he calls C. giraldiana var. subcanescens).

Léveillé's original (1912) description is: "Ramuli pulverulenti; folia ampla usque ad 18 x 7 cm. petiolata, petiolo pulverulento obovata acuminata ad basim abrupte attenuata supra pilosa viridia subtus cinereo-tomentosa, sub lente reticulata, inconspicue denticulata; flores composite corymbosi, purpureo-rubri; pedunculi, pedicelli et calyces cinereo-pulverulente; calycis dentes breves obtusi; corolla calyce 2-plo longior; stamina purpurea longe exserta. Species indumento cinereo-tomentosa et colore florum insignis."

Rehder (1934) places C. grisea Hand.-Mazz. in the synonymy here, but I regard it as typical C. bodinieri Lévl. Besides citing an isotype of C. grisea, Wang-Te-Hui s.n. [Handel-Mazzetti 182], in the Arnold Arboretum herbarium, he cites the following: CHINA: Honam-Hupeh border: L. H. Bailey s.n. [Chikungshan, June 18, 1917]. Kweichow: Cavalerie 1026 (A--merotype, A--photo). Szechuan: W. P. Fang 1235 (A).

Only 2 herbarium specimens and 2 mounted photographs have been examined by me.

Citations: CHINA: Hunan: Fan & Li 262 (Bz--17294, N, N--photo, Z--photo).

CALLICARPA BODINIERI var. ROSTHORNII (Diels) Rehd., Journ. Arnold Arb. 15: 323. 1934.

Synonymy: Callicarpa longifolia var. rosthornii Diels in Engl., Bot. Jahrb. 29: 548. 1900. Callicarpa giraldiana var. rosthornii Rehd. in Sarg., Pl. Wils. 3: 367. 1916. Callicarpa giraldiana var. rosthornii (Diels) Rehd. ex P'ei, Mem. Sci. Soc. China 1 (3): [Verbenac. China] 37. 1932.

Bibliography: Diels in Engl., Bot. Jahrb. 29: 548. 1900; Rehd. in Sarg., Pl. Wils. 3: 367--368. 1916; Mottet, Rev. Hort. 94: 391. 1923; H. H. Chung, Mem. Sci. Soc. China 1 (1): 225. 1924; P'ei, Mem. Sci. Soc. China 1 (3): [Verbenac. China] 16 & 37. 1932; Rehd., Journ. Arnold Arb. 15: 323. 1934; Moldenke in Fedde, Repert. Spec. Nov. 40: 95 & 98. 1936; Moldenke, Prelim. Alph. List Invalid Names 11. 1940; Moldenke, Known Geogr. Distrib. Verbenac., ed. 1, 56 & 86. 1942; Moldenke, Alph. List Invalid Names 10. 1942; Moldenke, Known Geogr. Distrib. Verbenac., ed. 2, 130 & 177. 1949; Moldenke, Résumé 167, 243, 245, & 443. 1959.

This variety differs from the typical form of the species and from var. giraldii (Hesse) Rehd. chiefly in its smaller and narrower leaf-blades, which are very gradually narrowed into the petiole, in the denser pubescence, and in the somewhat longer anthers.

The type of the variety was collected by A. von Rosthorn (no. 293) — in whose honor it is named — at Shou-tzu-p'ing, Szechuan, China, in August, 1891, and was deposited in the herbarium of the Botanischer Garten in Berlin, but is now destroyed.

Diels' original description (1900) of this taxon is "Foliis membranaceis utrinque crebre glandulosis subtus praeterea stellato-subcinereis oblanceolatis vel obovato-oblongis basin versus longissime cuneatim angustatis apice acuminatis parte superiore serrulatis. 1.5--2 m. hohes Bäumchen mit 2.5 cm. Stamm-Umfang. Blätter (mit Einschluss der stielartigen Basis) 8--10 x 2--3 cm... Durch das schmale, unterseits grau behaarte Blatt sofort vor allen bisher beschreibenen Formen des Kreises zu erkennen."

P'ei (1932) describes the plant as "A shrub; branchlets pubescent with stellate hairs. Leaves oblanceolate or obovate-oblong, densely pubescent beneath, sparsely pubescent above, densely glandular with bright scarlet glands on both surfaces, 5 to 7 cm. long, 1.3 to 1.7 cm. long [=wide], serrate at the upper part, acuminate at the apex, tapering at the base, chartaceous, about 7 lateral nerves on each side of the midrib. Petiole 0.8 to 1 cm. in length. Calyx truncate, densely pubescent without. Corolla small, not exceeding 2 mm. in length. Fruit globose, 0.12 cm. in diameter.....This differs from the type and from C. Giraldiana Hesse var. subcanescens Rehd. by its smaller leaves."

Rehder (1934) records the variety from Kwangsi and Szechuan. It has been collected in flower in August. The Ching 5666, distributed as C. bodinieri var. rosthornii and cited by P'ei (1932), is actually C. japonica var. angustata Rehd.

I know nothing about this taxon except what is stated in the literature quoted above.

CALLICARPA BORNEËNSIS Moldenke, Phytologia 4: 285--286. 1953.

Bibliography: Moldenke, Phytologia 4: 285--286. 1953; Moldenke, Biol. Abstr. 27: 3121. 1953; Moldenke, Résumé Suppl. 14: 4. 1966.

Woody plant; stems coarse, very conspicuously tetragonal with rounded angles, very deeply sulcate between the angles, more or less tomentose with brownish branched hairs, more densely so at the nodes; nodes not annulate; principal internodes 6--9 cm. long; leaves decussate-opposite, very large, sessile, somewhat amplexicaul at the base, obovate, thin-chartaceous, gray-green on both surfaces, 47--50 cm. long, 9--15.5 cm. wide, acuminate at the apex, more or less densely stellate-pubescent or tomentellous on both surfaces, less so in age above, much more densely along the midrib on both surfaces, often densely villous along the midrib above, abundantly glandular-denticulate along the margins; midrib very stout, flat above, very prominent beneath; secondaries slender, about 15 per side, divergent-ascending, arcuately anastomosing at the margins, flat above, prominent beneath; tertiaries numerous, regular, subparallel, at right angles to the secondaries, obscure above, prominent beneath; veinlet reticulation abundant, obscure above, prominulous beneath; inflorescence axillary, cauliflorous, fasciculate-cymose, densely sordid-pubescent or tomentellous throughout; peduncles, inflorescence-branches, and pedicels very slender, the pedicels much elongated, 7--15 mm. long; calyx campanulate, canescent-puberulent throughout, with a few larger branched hairs near the apex, about 2 mm. long and wide, its rim minutely 5-toothed; corolla and stamens not well enough developed for description; pistil apparently one; style terminal; stigma capitate.

The type of this very distinct species was collected by F. H. Endert (no. 3723) at W. Koetai in central eastern Borneo, at an altitude of 1100 meters, on September 29, 1925, and is deposited in the Herbarium Bogoriense at Buitenzorg. Unfortunately, the inflorescences are so badly infested with fungus and the flowers so very young that one cannot be sure of the floral characters. Mr. Joseph V. Monachino, however, has examined the plant carefully and has agreed with me that it is probably verbenaceous, and, if so, then probably a species of this genus. It was also sent to me by the curators of the Buitenzorg herbarium as verbenaceous. The species is known thus far only from the type specimen; only this and 2 mounted photographs of it have been examined by me.

Citations: INDONESIA: GREATER SUNDA ISLANDS: Endert 3723 (Bz--72607--type, N--photo of type, Z--photo of type).

CALLICARPA BRACTEATA Dop, Bull. Soc. Hist. Nat. Toulouse 64: 507--508. 1932.

Bibliography: P. Dop, Bull. Soc. Hist. Nat. Toulouse 64: 507--508 & 512. 1932; P. Dop in Lecomte, Fl. Gén. Indo-Chine 4: 799. 1935; Worsdell, Ind. Lond. Suppl. 1: 160. 1941; Moldenke, Known Geogr. Distrib. Verbenac., ed. 1, 58 & 86 (1942) and ed. 2, 135 & 177. 1949; Moldenke, Résumé 175 & 443. 1959.

Illustrations: P. Dop in Lecomte, Fl. Gén. Indo-Chine 4:799. 1935.

BOOK REVIEWS

Alma L. Moldenke

"Flora of the Prairies and Plains of Central North America" by Per Axel Rydberg, vii & 969 pp., illus., reprinted for the New York Botanical Garden by Hafner Publishing Company, New York & London, 1965 [Facsimile of the original edition of 1932]. $12.00

For quite some time this valuable work has been out of print and yet still in demand. The offset process has made its reappearance possible as it has done and will continue to do for several gems in several fields.

Dr. Rydberg planned this flora as a complete manual of the Spermatophyta and Pteridophyta of Kansas, Nebraska, Iowa, Minnesota, the Dakotas, southern Manitoba and southeastern Saskatchewan. By extension it also includes most of the species in the prairie regions of Illinois, southern Wisconsin, northern Missouri, and in the plains regions of eastern Colorado and eastern Montana. It was new in its field and nothing has surpassed it since. Of course new plants have been recorded for this area since the book was published and there have been nomenclatural changes in this time interval. Steyermark's more recent "Flora of Missouri" indicates some of these changes for the overlapping areas.

"Illustrations to the Flora of Delhi" by J. K. Maheshwari, xx & 282 pp., illus., Council of Scientific and Industrial Research, New Delhi, India. 1965. Rs. 28.00 or Sh. 56 or $8.00

These 278 line drawings of plants planned mostly by the author from fresh material provide a companion volume to "The Flora of Delhi" of 1963 which covered 531 indigenous or naturalized and 411 cultivated species of angiosperms. These clear cut illustrations represent 206 genera and 66 families. The book contains a few pages of text addenda and nomenclatural changes.

"Guide to the Plants of the Everglades National Park" by Alex D. Hawkes, 50 pp., illus., Tropic Isle Publishers, Inc., Coral Gables, Florida. 1965. $2.00

Choosing the more immediately apparent and the more spectacular indigenous plants from this unique 2300 square mile area, the author has described them simply and clearly in family groups and has illustrated several in exquisite color and black-and-white photographs. This is indeed a lovely souvenir for the visiting botanist as well as for the general tourist in the south Florida area.

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MISSOURI BOTANICAL

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NOTES ON GRASSES

Jason R. Swallen

The following notes have accumulated during recent years. They should be taken as notes and not as revisions of the groups concerned. Retirement has given me the time and opportunity to prepare them for publication.

Parvifolia Group of Panicum

First glume broad, 2/3 the length of the spikelet.
  Spikelets 2 mm. or more long.
    First glume 5-nerved.
      Blades glabrous or nearly so.
        Blades narrow..... 1. P. carannasense
        Blades broad..... 2. P. caaguense
      Blades pilose on both surfaces.
                3. P. errabundum
    First glume 3-nerved.
      Blades mostly about 3 mm. wide, linear, stiffly spreading, glabrous.. 4. P. wettsteinii
      Blades mostly 4-5 mm. wide, shorter, pilose on both surfaces. 5. P. pseudisachne
  Spikelets less than 2 mm. long.
    Spikelets 1.7-1.8 mm. long.
      Plants erect.
        Plants annual. 6. P. kaietukense
        Plants perennial from rhizomes.
                7. P. savannarum
      Plants decumbent-spreading, without rhizomes; blades cordate or subcordate, pubescent.
        Blades 1-2 cm. wide, pubescent.
                8. P. semitectum
        Blades less than 1 cm. long, glabrous.
                9. P. helobium
Spikelets 1.2-1.5 mm. long.
  Culms mostly erect, at least not decumbent-spreading.
    Culms stout; blades more than 5 mm. wide.
      Blades mostly not over 7 mm. wide, not clasping. 10. P. cyanescens
      Blades as much as 15 mm. wide, the base of the blades conspicuously clasping.
                11. P. nervosum
  Culms slender, the blades distant.
    Blades narrow, at least some of them involute; spikelets 1.6 mm. long.
                12. P. orinocanum

Blades broader, not at all involute; spikelets 1.4 mm. long.
13. P. vinnulum
Culms slender, decumbent or creeping.
Blades 1-3 cm. long, usually spreading or reflexed, glabrous; culms nearly simple.
14. P. parvifolium
Blades much longer, pubescent or pilose on both surfaces; culms with short dense branches from the upper nodes.
15. P. egleri
First glume relatively narrow, usually acute or subacute, rarely more than half the length of the spikelet.
Spikelets pilose.
Spikelets 0.8-1 mm. long.
Ligule arcuate; culms about 30 cm. tall; blades appressed, 5 mm. wide.
16. P. subinclusum
Ligule straight; culms not more than 20 cm. tall, usually much less; blades spreading, not over 2 mm. wide.
Spikelets 0.8 mm. long.
Culms sparingly branching, not more than 10 cm. tall..... 17. P. obovatum
Culms freely branching from all the nodes.
18. P. froesii
Spikelets 1 mm. long. Panicles small, usually partly enclosed in the sheath; spikelets on short stiff pedicels.
19. P. siccaneum
Spikelets 1.2-1.4 mm. long.
Ligule straight.
Culms creeping, long and tangled.
20. P. fonticolum
Culms erect or decumbent, not creeping.
Plants annual..... 21. P. tamayonis
Ligule arcuate.
Annual; culms tufted, erect or spreading at the base.
Blades linear, not more than 1.5 mm. wide.
22. P. gracilissimum
Blades subcordate, ovate or ovate-lanceolate, up to 4 mm. wide.
First glume narrow, somewhat remote.
23. P. graniticum
First glume broad, not remote.
24. P. pandum
Perennial?; culms decumbent-spreading or creeping.
Culms very slender, widely creeping, becoming tangled.
25. P. yavitaense

Culms relatively slender, decumbent at the base only.
Panicles small, rather dense, 1-2 cm. long..... 26. P. petrense
Panicles very open, up to 8 cm. long.
Culms nearly simple; spikelets 1.1 mm. long..... 27. P. mauryi
Culms freely branching; spikelets 1.3-1.4 mm. long.
28. P. goeldii

Spikelets glabrous.
Spikelets 0.9-1 mm. long.
Blades involute, soft and fine; culms decumbent-spreading, branching.
29. P. petilum
Blades flat.
Plants annual.
Culms with short branches from the node; panicles to 2 cm. long, about as wide as long..... 30. P. polycomum
Culms simple or with one or two branches; panicles as much as 8 cm. long, much longer than wide.
31. P. arctum
Plants perennial.
Ligule arcuate; blades elliptic-lanceolate.
Culms erect or ascending; panicles relatively larger, exserted.
Foliage glabrous or nearly so.
32. P. granuliferum
Foliage conspicuously pilose or hispid, bluish-glaucous.
33. P. spissifolium
Culms widely creeping; panicles small, usually partly enclosed in the sheath. 34. P. kuhlmanni
Ligule straight; blades linear.
35. P. kappleri

Spikelets 1.2-1.4 mm. long.
Culms very slender, creeping, becoming tangled.
36. P. blackii
Culms erect or decumbent at the base, not creeping.
Plants annual.
Lateral spikelets with pedicels as long as or shorter than the spikelets.
23. P. graniticum
Lateral spikelets with pedicels much longer than the spikelets.
37. P. angulosum
Plants perennial.
Ligule straight. Blades about 1 cm. long, crowded..... 38. P. densifolium

Ligule arcuate.
Blades linear, 4-5 cm. long, 2 mm. wide.
39. P. micranthum
Blades elliptic, 4-5 mm. wide.
Blades thin, lax, spreading, sparsely pilose or nearly glabrous; spikelets pointed, the second glume as long as the fruit.
40. P. rivale
Blades firm, appressed, glaucous, glabrous; second glume distinctly shorter than the fruit.
41. P. politii

1. PANICUM CARANNASENSE Mez, Notizbl. Bot. Gart. Berlin 7: 73. 1917.
Type: Brazil: Minas Gerais, near Carannas, Sellow 204.

2. PANICUM CAAGUENSE Henr. Med. Rijks. Herb. Leiden 47: 2. 1922.
Type: Paraguay: Caaguayu, Balanse 22.

3. PANICUM ERRABUNDUM Hitchc. Contr. U. S. Nat. Herb. 22. 494. f. 85. 1922.
Type: British Guiana: Parika, Hitchcock 16817.

4. PANICUM WETTSTEINII Hack. Ergeb. Bot. Exped. Akad. Wiss. Sudbras. 12. 1906; Denkschr. Akad. Wiss. Math. Naturw. (Wien) 79: 73. 1908.
P. rectissimum Mez, Notizbl. Bot. Gart. Berlin 7: 73. 1917. Brazil: Glaziou 17955.
Type: Brazil: São Paulo, near S. Bernardo, Wettstein & Schiffner.

5. PANICUM PSEUDISACHNE Mez, Notizbl. Bot. Gart. Berlin 7: 71. 1917.
Type: Brazil: Glaziou 13330.

6. PANICUM KAIETUKENSE Tutin, Journ. Bot. Brit. & For. 72: 340. f. 11. 1934.
Type: British Guiana: "Kaietuk" savanna, Potaro River, Tutin 688.

7. PANICUM SAVANNARUM Soderstrom, Mem. N. Y. Bot. Gard. 12(3): 2. 1965.
Type: British Guiana: Essequibo District: Kaieteur Plateau, Cowan & Soderstrom 2195.

8. PANICUM SEMITECTUM Swallen, nom. nov.
P. emergens Doell in Mart. Fl. Bras. 2(2): 269. 1877. Not P. emergens Hochst. Flora 38. 196. 1855.
Type: Brazil: São Paulo, Riedel 1961.

9. PANICUM HELOBIUM Mez ex Ekman, Med. Rijks. Herb. Leiden. 40: 52. 1921.
Type: Argentina: Misiones: Loreto, Ekman 650.

10. PANICUM CYANESCENS Nees in Trin. Gram. Pan. 202. 1826; Agrost. Braz. 220. 1829.
Type: "V. spp, Brazil. (Link. Mertens)."

11. PANICUM NERVOSUM Lam. Encycl. 4: 747. 1798.
Type: French Guiana: Isle de Cayenne, Desfontaines.

12. PANICUM ORINOCANUM Luces, Journ. Washington Acad. Sci. 32: 164. f. 9. 1942.
Type: Venezuela: Alto Orinoco, Puerto Ayacucho, Ll. Williams 13090.

13. PANICUM VINNULUM Swallen, sp. nov.
Culmi graciles, erecti, 40-50 cm. alti; ligula arcuata 0.3 mm. longa; laminae anguste adscendentes vel appressae, 2.5-4.3 cm. longae, 2.5-3 mm. latae, acuminatae; spiculae 1.3-1.4 mm. longae, longe-pedicellatae; gluma prima spicula 1/3-1/4 brevior.
Perennial; culms slender, erect from a rhizome-like base, 45-50 cm. tall, glabrous; sheaths shorter than the internodes, glabrous; ligule arcuate, 0.3 mm. long; blades narrowly ascending or appressed, 2.5-4.3 cm. long, 2.5-3 mm. wide, acuminate, glabrous; panicles 5-6 cm. long, 4 cm. wide with ascending branches about 3 cm. long; spikelets purple, 1.3-1.4 mm. long, on long slender pedicels, glabrous; first glume 2/3-3/4 as long as the spikelet, broad, rounded or subobtuse, 3-nerved; second glume and sterile lemma equal, just covering the fruit, 5-nerved, the sterile lemma with a staminate flower; fruit white, shining.
Type in the U. S. National Herbarium, No. 1961194, collected in banhado, Estação Experimental, Ponta Grossa, Paraná, Brazil, January 31, 1946, by Jason R. Swallen (No. 8374).

14. PANICUM PARVIFOLIUM Lam. Tabl. Encycl. 1: 173. 1791.
Type: "Ex Amer. merid. communis. D. Richard."

15. PANICUM EGLERI Swallen, sp. nov.
Culmi erecti vel decumbentes 30-40 cm. alti, ramosi; ligula brevissima, arcuata; laminae 4-4.5 cm. longae, 4-5 mm. latae, adscendentes, pilosae vel glabrae; spiculae 1.5 mm. longae, glabrae, pedicellis brevis rigide divergentibus; gluma prima spicula 1/3 brevior.
Perennial; culms erect or decumbent, reddish, 30-40 cm. long, branching; sheaths of the main culm

about as long as or shorter than the internodes, shorter than the internodes on the branches, papillose-pilose especially on the margins and the lower part, sometimes over the back; ligule arcuate, very short; blades of the main culm 4-5.5 cm. long, 4-5 mm. wide, ascending, densely pilose to nearly glabrous on both surfaces, the leaves of the branches reduced; panicles shortly exserted, 2-4 cm. long, with a few widely spreading solitary branches; spikelets 1.5 mm. long on relatively short, stiffly spreading pedicels, glabrous; first glume 2/3 the length of the spikelet, broad, triangular, subacute, 3-nerved; second glume and sterile lemma equal, just enclosing the fruit.

Type in the U. S. National Herbarium, No. 2307286, collected at Rio Cururu, Tapajós, Pará, Brazil, July 17, 1959, by W. A. Egler (No. 921).

16. PANICUM SUBINCLUSUM Swallen, Mem. N. Y. Bot. Gard. 9: 260. 1957.

Type: Venezuela: Amazonas: Río Atabapo, Bassett Maguire 29271.

17. PANICUM OBOVATUM Doell in Mart. Fl. Bras. 2(2): 256. 1877.

Type: Brazil: Amazonas: S. Gabriel, Spruce 2341.

18. PANICUM FROESII Swallen, sp. nov.

Culmi graciles, erecti vel adscendentes, ramosissimi, 10-20 cm. alti; ligula ca. 0.1 mm. longa; laminae 1-2 cm. longae, 1-2 mm. latae; spiculae 0.8 mm. longae, obovatae, papilloso-hispidae; gluma prima spicula 1/2 brevior, late acuta; fructus albidus 0.6 mm. longus.

Annual; culms very slender, erect or ascending, more or less geniculate, branching at most of the nodes, 10-20 cm. tall, the nodes with a few long hairs; sheaths mostly shorter than the internodes, pilose, especially on the margins; ligule very short, about 0.1 mm. long; blades 1-2 cm. long, 1-2 mm. wide, sparsely pilose; panicles 2-3.5 cm. long, about as wide, with spreading few-flowered branches; spikelets 0.8 mm. long, obovate, pointed, narrowed to the base, papillose-hispid; first glume about half as long as the spikelet, broadly acute; second glume and sterile lemma equal, slightly pointed beyond the fruit, strongly 5-nerved, the lemma empty; fruit white, about 0.6 mm. long.

Type in the U. S. National Herbarium, No. 1910784, collected on sandy river banks, Irauassú, Aiary, Içana, Amazonas, Brazil, November 6, 1945, by Ricardo de Lemas Fróes (No. 21383).

Colombia: Vaupes: Río Vaupes: Circasia, Schultes & Cabrera 19698; Cerro Circasia, Schultes 5843. Venezuela: Territory Amazonas: Maroa, Maguire, Wurdack & Keith 41702; Pimichin-Yavita trail, Maguire, Wurdack & Keith 41792; between Maroa and Sabanita, Maguire, Wurdack & Bunting 36423. Brazil: Amazonas: Tunuí, Lutzelburg 22946; Territory Rio Branco: Campos Gerais, region of Caracarahy, Fróes 23618.

19. PANICUM SICCANEUM Trin. Linnea 10: 298. 1836.
Type: Brazil: Colares, Rio Amazonas, Poeppig.

20. PANICUM FONTICOLUM Swallen, Mem. N. Y. Bot. Gard. 9: 260. 1957.
Type: Venezuela: Amazonas: Cerro Duida, Maguire, Cowan & Wurdack 29636.

21. PANICUM TAMAYONIS Luces, Bol. Soc. Venez. Cienc. Nat. 15: 24 f. 17. 1953.
Type: Venezuela: Bolívar: Gran Sabana, Tamayo 3061.

22. PANICUM GRACILISSIMUM Swallen, Mem. N. Y. Bot. Gard. 9: 259. 1957.
Type: Venezuela: Amazonas: Puerto Ayacucho, Maguire, Wurdack & Bunting 36043.

23. PANICUM GRANITICUM Swallen, sp. nov.

Culmi erecti vel adscendentes, ramosi, 9-15 cm. alti; ligula arcuata 0.3 mm. longa; laminae 1-1.5 cm. longae, 2-4 mm. latae, longipilosae; spiculae 1.2-1.3 mm. longae, glabrae vel sparse pilosae, pedicellis brevis rigidis; gluma angusta, acuta, spicula 1/3 brevior, paula remota.

Annual; culms erect or ascending, freely branching, 9-15 cm. tall, the nodes sparsely bearded, the hairs long; sheaths much shorter than the internodes, the lower ones densely long-pilose, the uppermost glabrous or pilose only on the margins; ligule arcuate, 0.3 mm. long; blades 1-1.5 cm. long, 2-4 mm. wide, somewhat cordate, spreading more or less long-pilose on both surfaces; panicles 2-5 cm. long, 2-3 cm. wide with a few stiffly ascending to reflexed branches; spikelets 1.2-1.3 mm. long, glabrous to sparsely pilose, on relatively short stiff pedicels, the lateral ones shorter than the spikelets; first glume narrow, acute, 1-3-nerved, about 2/3 the length of the spikelet, somewhat remote; second glume and sterile lemma acute, 5-nerved, pointed beyond the fruit; fruit 1 mm. long, obovate, acute, obscurely papillose or scabrous, yellowish.

Type in the U. S. National Herbarium, No. 2434514, collected on exposed granite, Iraimakipang Summit,

Kanuku Mountains, British Guiana, altitude 3500 feet, August 18, 1963, by R. Goodland & P. F. Maycock (No. 453).

24. PANICUM PANDUM Swallen, Brittonia 3: 150. 1939.
Type: Venezuela: Mount Auyan-Tepuí, Tate 1287.

25. PANICUM YAVITAENSE Swallen, sp. nov.
Culmi graciles, ramosi, implicati, 30 cm. longi, nodis barbatis; ligula arcuata, brevissima; laminae 2.5-5 cm. longae, 2-6 mm. latae, longipilosae; spiculae ellipticae 1.2 mm. longae, pedicellis longis capillaribus hispidis; gluma prima spicula 1/2 brevior.

Annual; culms slender, branching, forming tangled masses, as much as 30 cm. long, the nodes bearded; sheaths much shorter than the internodes, long-pilose; ligule arcuate, very short; blades 2.5-5 cm. long, 2-6 mm. wide, thin, long-pilose; panicles 7 cm. long, about as wide, with ascending to spreading slender pilose branches; spikelets elliptic, pointed, 1.2 mm. long on long slender capillary hispid pedicels; first glume 1/2 as long as the spikelet, narrow, acutish, 3-nerved; second glume and sterile lemma equal or the glume a little shorter, just covering the fruit or slightly pointed beyond it; fruit 0.9 mm. long, white, shining.

Type in the U. S. National Herbarium, No. 2307253, collected along Yavita-Pimichin trail near Yavita, Territory Amazonas, Venezuela, June 10, 1959, by John J. Wurdack & L. S. Adderly (No. 42910).

This species was also collected at Yurupari, Vaupes, Colombia, by J. Cuatrecasas No. 6968.

26. PANICUM PETRENSE Swallen, Mem. N. Y. Bot. Gard. 9: 259. 1957.
Type: Venezuela: Amazonas: Río Atabapo, Bassett Maguire 29259.

27. PANICUM MAURYI Swallen, Fieldiana 28: 26. 1951.
P. micranthus var. hirtum Maury, Journ. de Bot. 3: 162. 1889.
Type: "Cerro Carichaud, savane seche, J. Chaff., n. 284."

28. PANICUM GOELDII Swallen, sp. nov.
Culmi basi decumbentes, ramosi, ca. 20 cm. alti, nodis barbatis; ligula arcuata brevissima; laminae 1.5-2.8 cm. longae, 1.5-4 mm. latae, appressae vel adscendentes, sparse pilosae; spiculae obovatae 1.3-1.4 mm. longae, pilosae; gluma prima spicula 1/2 brevior.

Perennial; culms decumbent at the base, freely

branching, about 20 cm. tall, glabrous, bearded at the nodes; sheaths mostly shorter than the internodes, hispid or papillose-hispid especially on the margins; ligule arcuate, very short; blades 1.5-2.8 cm. long, 1.5-4 mm. wide (mostly 3-4 mm.), appressed or ascending, sparsely pilose on both surfaces, with a few papillose based hairs on the margins at the rounded base; panicles up to 6 cm. long, with ascending branches about 3 cm. long; spikelets obovate, 1.3-1.4 mm. long, pilose; first glume broadly triangular, about half as long as the spikelet; second glume and sterile lemma equal or the glume a little shorter; fruit smooth, shining, pale yellowish.

Type in the U. S. National Herbarium, No. 1039731, collected on Estate Gavinho, Marajó Island, Pará, Brazil, June, 1918, by Andre Goeldi (No. 222).

Additional material examined: Surinam: One kilometer NW. of Viltzberg, Coppenane River, Schulz & Donselaar 10555, 10559.

29. PANICUM PETILUM Swallen, sp. nov.

Culmi gracillimi basi decumbentes, adscendentes, ramosissimi, 30-40 cm. longi; ligula 1 mm. longa; laminae 1.5-2.5 cm. longae, involutae, adscendentes vel reflexae; spiculae 1 mm. longae, glabrae; gluma prima spicula 1/2 brevior, subobtusa.

Perennial; culms very slender, decumbent spreading at the base, ascending, 30-40 cm. long, freely branching; sheaths shorter than the internodes on the main culm, much longer than the internodes on the branches, glabrous; ligule less than 0.1 mm. long, glabrous; blades 1.5-2.5 cm. long, involute, ascending to reflexed; panicle 1.5-3 cm. long, few-flowered, the branches spreading, glabrous; spikelets 1 mm. long, glabrous; first glume half as long as the spikelet, blunt, 3-nerved; second glume and sterile lemma 5-nerved, blunt, as long as the spikelet, or the glume a little shorter; fruit white, minutely papillose-roughened.

Type in the U. S. National Herbarium, No. 1910820, collected in wet pockets on side of mountain among dense mosses, "Cerro Canejen," Department Vaupes, Colombia, July 24, 1943, by Carl O. Grassl (No. 10009).

30. PANICUM POLYCOMUM Trin. Mem. Acad. St. Petersb. VI. Sci, Nat. 1: 306. 1834.

Type: "V. spp. Guian."

31. PANICUM ARCTUM Swallen, Bull. Torrey Club 75: 87. 1948.

Type: Surinam: Tafelburg, Maguire 24214.

32. PANICUM GRANULIFERUM H.B.K. Nov. Gen. et Sp. 1: 105. 1815.

Type: Venezuela: "Crescit in ripa fluminum Apure, Atabapo et Tuamini (Prov. Novae Guayanae)."

33. PANICUM SPISSIFOLIUM Swallen, Bull. Torrey Club 75: 86. 1948.

Type: British Guiana: Kaieteur Savanna, Maguire & Fanshawe 23097.

34. PANICUM KUHLMANNI Swallen, sp. nov.

Culmi 10-20 cm. longi, graciles, ramosi, basi decumbentes; ligula brevissima, recta; laminae 1-2.5 cm. longae, 1-3 mm. latae, appressae; spiculae obovatae, 0.9-1 mm. longae, glabrae, pedicellis brevibus, rigidis, glabris; gluma prima enervis, spicula 1/2 brevior.

Annual; culms 10-20 cm. long or longer, slender, freely branching, decumbent spreading, forming a tangled mat, glabrous; sheaths usually much shorter than the internodes, glabrous or with a few hairs on the margins; ligule very short, straight; blades 1-2.5 cm. long, 1-3 mm. wide, appressed, glabrous; panicles partly enclosed in the sheath, 1-2.5 cm. long, about 1 cm. wide with a few ascending branches, glabrous throughout; spikelets obovate, 0.9-1 mm. long, on relatively short stiff pedicels, glabrous; first glume apparently nerveless, less than half the length of the spikelet; second glume and sterile lemma equal, 5-nerved, just covering the white fruit.

Type in the U. S. National Herbarium, No. 1255681, collected on Campo do Pute between Araão Melgaes and Pimento Bueno, Mato Grosso, Brazil, June 1918, by Kuhlmann (No. 1778).

35. PANICUM KAPPLERI Steud. Syn. Pl. Glum. 1: 90. 1854.

Type: Surinam: Kappler 477.

36. PANICUM BLACKII Swallen, sp. nov.

Culmi gracillimi, decumbentes, ca. 30 cm. longi; laminae 1-1.5 cm. longae, 1.5-2 mm. latae, adscendentes, villosae; ligula brevissima, recta; spiculae 1.3-1.4 mm. longae, glabrae; gluma prima spicula 1/2 brevior, acuta, 3-nervis.

Perennial?; culms very slender, decumbent-spreading, about 30 cm. long, glabrous; sheaths usually much shorter than the internodes, glabrous; ligule very short, straight; blades 1-1.5 cm. long, 1.5-2 mm. wide, stiffly ascending, blunt, villous on both surfaces, with rather prominent white margins; panicles 3-4 cm. long with few to several slender, ascending, few-flowered branches; spikelets 1.3-1.4 mm. long,

glabrous; first glume 1/2 as long as the spikelet, acute, 3-nerved; second glume and sterile lemma equal, just covering the fruit, obtuse, the sterile lemma containing a well-developed staminate flower; fruit white.

Type in the U. S. National Herbarium, No. 2238102, collected on campo, Fazenda Capela, Territory of Rio Branco, Brazil, November 7, 1951, by George Black (No. 51-14071).

37. PANICUM ANGULOSUM Swallen, sp. nov.

Culmi graciles, erecti vel divergentes, ramosi, geniculati, usque ad 22 cm. longi; ligula arcuata, 0.6 mm. longa, glabra; laminae 1.5-3.4 cm. longae, usque ad 3 mm. latae, planae, sparse pilosae; spiculae 1.4 mm. longae; glabrae vel ± scabrae, purpurascentes; gluma prima acuta, spicula 1/2 brevior.

Annual; culms slender, erect to spreading, geniculate and branching at the nodes, as much as 22 cm. long, glabrous; sheaths much shorter than the internodes, glabrous or sparsely pilose; ligule arcuate, 0.6 mm. long, glabrous; blades 1.5-3.4 cm. long, as much as 3 mm. wide, flat, glabrous to sparsely pilose; panicles up to 8 cm. long, 11 cm. wide, with a few solitary widely spreading to reflexed branches, rather few-flowered, glabrous throughout; spikelets 1.4 mm. long, glabrous or somewhat scabrous, purple; first glume acute, 3-nerved, half as long as the spikelet; second glume and sterile lemma equal or the glume slightly shorter than the fruit, rounded, 5-nerved; fruit as long as the spikelet, rather thin, whitish.

Type in the U. S. National Herbarium, No. 2380390, collected in sandy rocky soil in full sun near brink of Kaieteur Fall, British Guiana, March 7, 1962, by R. S. Cowan & T. R. Soderstrom (No. 2064).

Additional specimens referred to this species: Venezuela: 105 km. from El Dorado to Santa Elena, Estado Bolívar, Foldats 2786. Brazil: Territory of Amapá, Rio Araguari, Pires, Rodrigues & Irvine 51139.

38. PANICUM DENSIFOLIUM Swallen, Fieldiana 28: 25. 1951.

Type: Venezuela: Amazonas: Esmeraldo (Cerro Duida), Steyermark 57755.

39. PANICUM MICRANTHUM H.B.K. Nov. Gen. et Sp. 1: 105. 1815.

Type: Venezuela: "Caracasana.....juxta Villa de Cura.....", Humboldt & Bonpland.

40. PANICUM RIVALE Swallen, Bull. Torrey Club 75: 87. 1948.

Type: Surinam: Tafelberg, Bassett Maguire 24732.

41. PANICUM POLITII Swallen, sp. nov.

Culmi erecti vel decumbentes, ramosi, ca. 30 cm. alti, glabri; ligula brevissima, arcuata; laminae adscendentes vel appressae, 1.5-4 cm. longae, 2-4 mm. latae, glabrae, vel sparse pilosae; spiculae 1.3-1.4 mm. longae, glabrae, purpurascentes, pedicellis ca. 1 cm. longis; gluma prima spicula 1/2 brevior, acuta, 1-nervis.

Perennial; culms erect or decumbent at the base, about 30 cm. tall, branching, glabrous; sheaths usually about half as long as the internodes, glabrous; ligule arcuate, very short; blades ascending or appressed, 1.5-4 cm. long, 2-4 mm. wide, glabrous or sparsely pilose above the ligule; panicles 4-8 cm. long, the slender solitary branches widely ascending or spreading, few-flowered; spikelets 1.3-1.4 mm. long, glabrous, tinged with purple, on pedicels approximately 1 cm. long; first glume half as long as the spikelet, acutish, 1-nerved; second glume obtuse, about 1/3 shorter than the fruit; sterile lemma slightly longer than the fruit, acute; fruit shining, yellowish brown.

Type in the U. S. National Herbarium, No. 2040162, collected on Santa Rosa Savana, Río Orinoco, Venezuela, November 17, 1948, by Bassett Maguire, H. R. Kunhardt, Jr. & Louis Politi (No. 27306).

Additional material examined: Venezuela: Territory Amazonas: Esmeraldo Ridge, Maguire & Wurdack; Santa Barbara Savanna, junction of Rios Ventuari and Orinoco, Maguire, Cowan & Wurdack 32044. Brazil: Pará: Rio Cumina, Sampaio 5334.

New Species of Panicum

Fasciculata

PANICUM OBLITUM Swallen, sp. nov.

Culmi erecti basi decumbentes, 20-35 cm. alti, dense villosi; laminae 3-8 cm. longae, 5-8 mm. latae, velutinosae; paniculae 6-9 cm. longae, 1-1.5 cm. latae, ramis adscendentibus vel appressis; spiculae 2.4-2.5 mm. longae, inflatae, glabrae; gluma prima spicula 1/2 brevior, acuta vel obtusa; fructus minute rugosus.

Annual; culms erect, or decumbent at the base, 20-35 cm. tall, densely pilose; sheaths a little shorter than the internodes, densely pilose like the culms; blades 3-8 cm. long, 5-8 mm. wide, thickly covered with dense hairs, velvety; panicles 6-9 cm. long, 1-1.5 cm. wide, the branches narrowly ascending or appressed, densely flowered, the main axis, branches

and pedicels long-pilose; spikelets 2.4-2.5 mm. long, inflated, glabrous; first glume almost half as long as the spikelet, acute or obtuse, broad and clasping; second glume and sterile lemma equal, just covering the fruit, 5-nerved, inflated, abruptly acute, whitish, the cells visable, the lemma containing a very well developed palea; fruit slightly ovate, 1.3 mm. wide, apiculate, yellowish, finely cross-wrinkled.

Type in the U. S. National Herbarium, No. 2181160, collected along "Carretera Central," between Chosica and Chicla, Province Huarochiri, Department Lima, Peru, March 24, 1952, by Ramón Ferreyra & P. C. Hutchison.

Pyrularia

PANICUM ICHUNENSE Swallen, sp. nov.

Culmi graciles, decumbentes, ramosi, usque ad 20 cm. longi; ligula arcuata, 0.8-1 mm. longa; laminae 2-4 cm. longae, 3-10 mm. latae, sparse longi-pilose; paniculae 2.5-6 cm. longae ramis patentibus vel reflexis usque ad 4.5 cm. longis; spiculae 2-2.2 mm. longae, attenuatae, pilosae; gluma prima spicula 1/5-1/3 brevior, acuta.

Annual; culms slender, decumbent spreading, freely branching, the branches erect, as much as 20 cm. long, glabrous or with a few long hairs at the nodes; sheaths all shorter than the internodes, very sparsely pilose with long hairs; ligule arcuate, 0.8-1 mm. long; blades 2-4 cm. long, 3-10 mm. wide, very thin, very sparsely long-pilose; panicles 2.5-6 cm. long, with widely spreading or reflexed few-flowered branches as much as 4.5 cm. long; spikelet 2-2.2 mm. long, attenuate at the base, pilose; first glume 2/3-4/5 as long as the spikelet, narrow, 3-nerved, acute; second glume and sterile lemma equal, pointed beyond the fruit, 5-nerved; fruit 1.7 mm. long, elliptic, acute, pale, finely papillose-roughened.

Type in the U. S. National Herbarium, No. 2382348, collected near waterfall spray, Salto Maria Espuma, Río Ichun, Sierra Ichun, tributary Río Paragua, Lat. 4° 46', Long. 63° 18', state of Bolívar, Venezuela, December 28, 1961, by Julian A. Steyermark (No. 90359). Also collected to the north of Salto Maria Espuma, Steyermark 90292.

Laxa

PANICUM MANACALENSIS Swallen, sp. nov.

Culmi erecti, firmi, glabri, 125 cm. alti; ligula arcuata, 0.2 mm. longa, minute ciliata; laminae 25-40 cm. longae, 6-10 mm. latae, attenuatae, glabrae; paniculae 35 cm. longae, pyramidales, ramis usque ad

12 cm. longis, ramosissimis; spiculae 1.4-1.5 mm. longae, ovatae, glabrae; gluma prima lata, spicula 1/2 brevior.

Perennial; culms erect, somewhat geniculate and rooting at the lower nodes, firm, glabrous, 125 cm. tall; sheaths about as long as the internodes, loose, glabrous; ligule arcuate, about 0.2 mm. long, minutely ciliate; blades 25-40 cm. long, 6-10 mm. wide, attenuate, glabrous on both surfaces; panicle 35 cm. long, pyramidal, the branches in fascicles of one or two, the lower fascicles 5 cm. distant becoming closer upward, flexuous, as much as 12 cm. long with numerous branchlets along them; spikelets 1.4-1.5 mm. long, ovate, pointed, glabrous, appressed to the branches; first glume broad, clasping, 1-3-nerved, about 1/2 as long as the spikelet; second glume and sterile lemma equal, the glume 5-nerved, the lemma 3-nerved, slightly pointed beyond the fruit; fruit 1.2 mm. long, elliptic, pointed, yellowish, smooth and shining.

Type in the U. S. National Herbarium, No. 2307255, collected in drowned margins of Río Atabapo at Manacal, Territory of Amazonas, Venezuela, June 19, 1954, by John J. Wurdack & L. S. Adderley (No. 42986).

This species resembles Panicum hylaeium Mez, but the blades are not at all cordate and the spikelets are pointed rather than blunt.

Stolonifera

PANICUM PIRINEOSENSE Swallen, sp. nov.

Culmi erecti, 1.3 m. alti, rhizomatosi; vaginae internodiis multo breviores, inferiores dense pubescentes, superiores glabrae; laminae 12-18 cm. longae, 1.2-2 cm. latae, pubescentes; inflorescentia 21 cm. longa, 5 cm. lata, racemis 40, inferioribus 3 cm. longis basi dense pubescentibus; spiculae 3.2 mm. longae brevipedicellatae; gluma prima triangularis, 3-5-nervis, spicula 1/2 brevior, in parte superiore pubescens; lemma sterile 2-glandulis 1/4 infra extremitatem praeditum.

Perennial; culms erect 1.3 m. high, apparently from short rhizomes, with densely pubescent cataphylls; sheaths mostly much shorter than the internodes, the lower ones densely pubescent, the upper glabrous, the collar area densely pubescent; ligule ciliate, about 1 mm. long; blades 12-18 cm. long, 1.2-2 cm. wide, acuminate, finely pubescent on both surfaces to nearly glabrous; inflorescence 21 cm. long, about 5 cm. wide, tapering to the summit, composed of about 40 spreading one-sided racemes, the lower ones 3 cm. long, floriferous to the base, the base densely pubescent; spikelets 3.2 mm. long, short-pedicellate in two rows on one side of the rhachis,

the second of a pair of spikelets usually abortive; first glume triangular, acute, 3-5-nerved, about half as long as the spikelet, irregularly pubescent or pilose in the upper half; second glume and sterile lemma equal, 5-7-nerved, bearing from or below the middle on the margins coarse spreading hairs 1 mm. long, pubescent or pilose across the back, the lemma bearing 2 glands about 1/4 below the summit; fruit 1.7 mm. long, yellowish, smooth and shining.

Type in the U. S. National Herbarium, No. 2236507, collected between rocks, at Pirineos, Goiás, Brazil, October 18, 1956, by Amaro Macedo (No. 4805).

Penicillata

PANICUM LONGIPEDICELLATUM Swallen, sp. nov.

Culmi basi decumbentes 1.6 m. longi, glabri; ligula 1 mm. longa, firma, hispido-ciliata, 2 mm. longa; laminae planae 35-41 cm. longae, 2.3-3.6 mm. latae, glabrae, marginibus valde scabris; panicula 40 cm. longa; spiculae 4-4.5 mm. longae, pedicellis 1-4 cm. longis; gluma prima spicula paulo longior vel brevior, 5-nervis, extremitate pilis longis praedita.

Culms erect from a long decumbent base, 1.6 m. long, glabrous; sheaths longer than the internodes, the uppermost elongate, prominently papillose-hispid with long spreading hairs; ligule 1 mm. long, firm, hispid-ciliate, the hairs up to 2 mm. long; blades 35-41 cm. long, 2.3-3.6 cm. wide, glabrous the margins very scabrous; panicle 40 cm. long, partly enclosed in the upper sheath, open at maturity; spikelets 4-4.5 mm. long on very scabrous pedicels 1-4 cm. long; first glume clasping, as long as the spikelet or nearly so, occasionally longer than the spikelets, acute or somewhat rounded papillose-roughened, strongly 5-nerved, bearing a few long hairs near the tip, and on the margins; second glume and sterile lemma equal, strongly 5-nerved, papillose-roughened; fruit 3.5 mm. long, striate, the margins of the lemma not inrolled, the summit somewhat crested.

Type in the U. S. National Herbarium, No. 1255492, collected on mountain slope below Macieiras, Serra de Itatiaia, Rio de Janeiro, Brazil, altitude 1000-1200 M., January 18, 1925, by Agnes Chase (No. 8342).

Additional specimens examined: Brazil: Paraná: Tres Barras, Dusén 17587; Santa Catarina: Alta Matador, Rio do Sul, R. Reitz 6101.

This species is allied with Panicum penicillatum Nees, which differs in having smaller, short-pedicellate spikelets, the first glume 3-nerved, and narrower, usually shorter blades.

Lorea

PANICUM FONTANALE Swallen, sp. nov.

Culmi erecti, 45-50 cm. alti, glabri; ligula deficiens; laminae usque ad 30 cm. longae, 3.5 cm. latae, ad basin angustatae, glabrae; spiculae 3.2 mm. longae, pedicellis spiculis multo longioris; gluma prima spicula 1/3 brevior.

Perennial; culms erect, 45-50 cm. tall, glabrous; sheaths glabrous elongate extending nearly to the base of the panicle with a much reduced blade; ligule wanting; blades as much as 30 cm. long, 3.5 mm. wide, flat, gradually narrowed toward the base to the width of the sheath, glabrous, even on the margins; panicle 9 cm. long with spreading to reflexed few-flowered branches; spikelets 3.2 mm. long on pedicels much longer than the spikelet; first glume 2/3 as long as the spikelet, subacuminate, glabrous or the keels somewhat scabrous toward the tip; second glume and sterile lemma equal, acute or subacute, 5-nerved, glabrous, the lemma with a very well developed staminate flower; fruit 2 mm. long, acute or subacuminate, white, glabrous.

Type in the U. S. National Herbarium, No. 2378641, collected "on top of waterfall," Steyermark Falls, on upper reaches of Río Tirica.....western part of Chimantá-tepuí, Bolívar, Venezuela, 1700-1750 M., July 3, 1953, by Julian A. Steyermark (No. 76005).

This species is apparently related to Panicum steyermarkii Swallen, but differs in having long attenuate blades, and larger and laxer panicles of smaller spikelets.

PANICUM LUTZII Swallen, sp. nov.

Culmi caespitosi, rhizomatosi, 35-50 cm. alti, foliis basi aggegatis; ligula brevissima, ciliata; laminae 15-30 cm. longae, basi conduplicatae, usque ad 5 mm. latae; spiculae 1.8-2 mm. longae, pedicellis plerumque breviores; gluma prima spicula 1/3 brevior, subacuta.

Culms caespitose, 35-50 cm. tall, glabrous, leaves crowded toward the base; sheaths glabrous, broad at the base, gradually narrowed toward the summit; ligule very short, ciliate; blades 15-30 cm. long, firm, more or less flexuous, erect, glabrous, conduplicate at the base, narrow, gradually wider, as much as 5 mm. wide; inflorescence 8-10 cm. long, about 1 cm. wide, the branches appressed, as much as 5 cm. long, naked at the base; spikelets 1.8-2 mm. long, glabrous, the pedicels usually shorter; first glume 2/3 as long as the spikelet, subacute, 3-nerved; second glume and sterile lemma subequal, obtuse, 3-5-nerved, the lemma including a palea and staminate flower; fruit 1.6 mm.

long, elliptic, acute, brownish.

Type in the U. S. National Herbarium, No. 2240718, collected on Tijuca, Rio de Janeiro, Brazil, February 1914, by Adolpho Lutz (No. 687).

Dichotoma

PANICUM TELMATUM Swallen, sp. nov.

Culmi decumbentes, ramosi, pilosi vel papilloso-pilosi; ligula dense ciliata ca. 1 mm. longa; laminae usque ad 5 cm. longae, 8 mm. latae, acutae appressae, marginibus scabrae et papilloso-ciliatae; spiculae 2.9 mm. longae, sparse pubescentes vel pilosae; gluma prima 2 mm. longa, acuta, 3-nervia; fructus 2.4 mm. longus, minute striatus.

Perennial; culms decumbent spreading with ascending ends, freely branching, pilose or papillose-pilose; lower sheaths a little shorter than the internodes becoming more or less crowded toward the ends of the branches, pilose to nearly glabrous; ligula a dense line of hairs about 1 mm. long; blades as much as 5 cm. long, 8 mm. wide, acute, appressed, sparsely hispid on the upper surface, the margins scabrous and papillose-ciliate; panicles partly enclosed in the sheaths or shortly exserted, 3-4.5 cm. long, about 1 cm. wide, with few rather narrowly ascending few-flowered branches, the main axis and branches pilose; spikelets 2.9 mm. long, sparsely pubescent or pilose; first glume 2 mm. long, broadly triangular, acute or rounded, 3-nerved; second glume and sterile lemma equal just covering the fruit, many nerved; fruit 2.4 mm. long, yellowish, minutely striate roughened.

Type in the U. S. National Herbarium, No. 2182190, collected in burnt part of boggy central area, Serra do Sol, Bolívar, Venezuela, 2100 m., December 28, 1954, by Bassett Maguire & Celia K. Maguire (No. 40400).

Panicum telmatum appears to be somewhat related to P. latiglume Doell, but it is caespitose rather than creeping, with larger and longer blades, and usually larger panicles.

Ungrouped

PANICUM ITATIAIAE Swallen, sp. nov.

Culmi basi decumbentes, ramosi, 1.7 m. longi; vaginae internodiis longiores vel breviores, glabrae, marginibus papilloso-hispidae; ligula 0.3 mm. longa, minutissime ciliata; laminae 10-12 cm. longae, 10-12 mm. latae, subcordatae, glabrae, marginibus scabrae et papilloso-hispidae; panicula 15 cm. longa, ramis patentibus, paucifloris, glabris; spiculae 4-4.5 mm. longae, glabrae; gluma prima 3-5-nervis, angusta, acuta; gluma secunda et lemma sterile 11-13-nervia,

gluma fructu breior, lemma fructu longior; fructus 3.8 mm. longus, 1.6 mm. latus, fuscus, marginibus planis, extremetate cristula pubescente praeditus.

Culms widely spreading from a long decumbent base, rooting at the nodes, sparingly branching, 1.7 m. long; sheaths a little longer or shorter than the numerous internodes, glabrous on the back, papillose-hispid on the margins; ligule 0.3 mm. long, minutely ciliate; blades 10-12 cm. long, 10-12 mm. wide, subcordate, acuminate, glabrous on both surfaces, scabrous and papillose-hispid on the margins; panicle long-exserted, 15 cm. long, about as wide, the branches spreading, few-flowered, glabrous, the axis more or less glandular-spotted; spikelets 4-4.5 mm. long, glabrous; first glume narrow, acute, 3-5-nerved; second glume and sterile lemma 11-13-nerved, the glume a little shorter, the lemma a little longer than the fruit; fruit 3.8 mm. long, 1.6 mm. wide, brown, the margins not inrolled, with a small pubescent crest at the summit.

Type in the U. S. National Herbarium, No. 1255836, collected under bamboo on mountain slope below Macieiras, Serra de Itatiaia, Rio de Janeiro, Brazil, 1700-1800 m. altitude, January 18, 1925, by Agnes Chase (No. 8327).

PANICUM INFUSCUM Swallen, sp. nov.

Culmi erecti vel decumbentes, 30-60 cm. longi, plerumque multinodosi; laminae 6-9 cm. longae, 6-12 mm. latae, subacuminatae, dense pubescentes; spiculae 1.8 mm. longae, nervosae, glabrae; gluma prima spicula 1/3-3/4 brevior, enervis vel 9-nervis; fructus fuscus, lucidus, ellipticus, apiculatus.

Perennial?; culms erect from a decumbent base, rooting at the lower nodes, 30-60 cm. long, usually with many short internodes; sheaths about as long as the internodes, rather densely pilose, the hairs spreading, with a dense rim of hairs on the collar; blades 6-9 cm. long, the uppermost reduced, 6-12 mm. wide, subacuminate, softly and densely pubescent on both surfaces; panicles 4.5-8 cm. long, the branches spreading, the main axis and branches pubescent; spikelets 1.8 mm. long, strongly nerved, glabrous; first glume 1/4 to 2/3 as long as the spikelet, nerveless or with as many as 9 nerves; second glume about 3/4 as long as the spikelets, 7-9-nerved, rounded; sterile lemma as long as the fruit, subacute, 9-nerved; fruit light brown, smooth and shining, elliptic, apiculate.

Type in the U. S. National Herbarium, No. 1448475, collected on steep shaded slope on trail to Tijuca, Guanabara, Brazil, altitude 700 m., April 28, 1930, by Agnes Chase (No. 12145).

PANICUM MULTINODOSUM Swallen, sp. nov.

Culmi erecti vel decumbentes, 55 cm. longi, nodis ca. 25; ligula 0.3-0.4 mm. longa; laminae 4.5-7 cm. longae, 7-11 mm. latae, subcordatae, dense pubescentes; spiculae 1.8-2 mm. longae, hirsutae; gluma prima spicula ca. 1/2 brevior, lata, 3-nervis; fructus fuscus tenuiter rugosus.

Perennial; culms erect to spreading, 55 cm. long, with about 25 nodes; sheaths all longer than the internodes, hirsute; ligule straight, 0.3-0.4 mm. long; blades 4.5-7 cm. long, 7-11 mm. wide, spreading, slightly asymmetrical, subcordate, finely and densely pubescent on both surfaces; panicle 12 cm. long with a few ascending to spreading few-flowered branches; spikelets 1.8-2 mm. long, hirsute; first glume a little more than half the length of the spikelet, broad, 3-nerved; second glume and sterile lemma obtuse, 5-nerved, the second glume shorter than the fruit; fruit light brown, ovate, acute, finely cross-wrinkled.

Type in the U. S. National Herbarium, No. 1612918, collected in open forest, Bragança, Pará, Brazil, June 27-29, 1934, by Jason R. Swallen (No. 5037).

The Serrata Group of Ichnanthus

Blades 4-5 mm. wide, about 30 cm. long; panicles lax, the pedicels slender, usually much longer than the spikelets..... 1. I. serratus

Blades 8-11 mm. wide, usually more than 50 cm. long; panicles stiff, the pedicels usually shorter than the spikelets.

Panicles large, open, 30 cm. long; blades ciliate for 15 cm. above the base. 2. I. neblinaensis

Panicles relatively small, usually narrow, not more than 20 cm. long.

Blades attenuate to a fine point, smooth and shining. Spikelets 3.4-3.6 mm. long. 3. I. longifolius

Blades acuminate, not shining.

Spikelets 3 mm. long, sparsely pilose with long hairs. 4. I. ephemeroblepharis

Spikelets 4-5 mm. long, glabrous.

Spikelets 5 mm. long; blades long-attenuate to the base; panicle branches spreading. 5. I. tectus

Spikelets 4 mm. long; blades narrowed but not long-attenuate to the base; panicle narrow, the branches ascending. 6. I. angustus

1. ICHNANTHUS SERRATUS Swallen, Fieldiana 28: 30. 1951.
Venezuela: Steyermark 58298.

2. ICHNANTHUS NEBLINAENSIS Swallen, sp. nov.

Culmi erecti, 1.35 m. alti, glabri; ligula ciliata 1 mm. longa; laminae usque ad 55 cm. longae, 8-11 mm. latae, firmae, glabrae, marginibus irregulatim et fortiter scabris; panicula 30 cm. longa, 10 cm. lata, ramis adscendentibus usque ad 15 cm. longis, dense scabris; spiculae 3.5 mm. longae, glabrae; gluma prima 2.5 mm. longa, acuta; fructus 3 mm. longus, acutus, alis ca. 1.5 mm. longis.

Perennial; culms erect, 1.35 m. tall, flattened, glabrous; lower sheaths much longer, the upper ones a little shorter than the internodes, glabrous or ciliate on one side; ligule a dense line of hairs about 1 mm. long; blades flat, elongate, as much as 55 cm. long, 8-11 mm. wide, firm, flat, glabrous on both surfaces, the margins ciliate for as much as 15 cm., the margins strongly and irregularly scabrous; panicle 30 cm. long, about 10 cm. wide, pyramidal, with ascending branches up to 15 cm. long, the branchlets spreading, the main axis, branches, and branchlets densely and finely scabrous; spikelets 3.5 mm. long, glabrous; first glume 2.5 mm. long, acute or rounded; second glume and sterile lemma equal, 5-nerved, the lemma with a well developed palea a little longer than the lemma; fruit 3 mm. long, elliptic, acute, straw-colored, the wings about half as long.

Type in the herbarium of the New York Botanical Garden, collected on west escarpment slopes of Cañon Grande east of Cumbre Camp, Cerro de la Neblina, Río Yatua, Territory of Amazonas, 1100-1300 meters, Venezuela, November 25, 1957, by Bassett Maguire, John J. Wurdack & Celia K. Maguire (No. 42239).

This species is allied to I. tectus Swallen and related species, but differs from all of them in the large open panicle and the long ciliate base of the blades.

3. ICHNANTHUS LONGIFOLIUS Swallen, Fieldiana 28: 29. 1951.
Venezuela: Steyermark 58020.

4. ICHNANTHUS EPHEMEROBLEPHARIS Black & Fróes, Bol. Inst. Agro. Norte 15: 5. 1948.
Brazil: Fróes 22898.

5. ICHNANTHUS TECTUS Swallen, Mem. N. Y. Bot. Gard. 9: 265. 1957.
Venezuela: Cowan & Wurdack 31139.

6. ICHNANTHUS ANGUSTUS Swallen, Mem. N. Y. Bot. Gard. 9: 266. 1957.
Venezuela: Phelps & Hitchcock 476.

A New Species of Sacciolepis

SACCIOLEPIS PUNGENS Swallen, sp. nov.

Culmi caespitosi, erecti, 90 cm. alti; ligula 0.2 mm. longa, minute ciliata; laminae firmae, nervosae, planae, usque ad 25 cm. longae, 3 mm. latae, supra minute pubescentes; spiculae 1.8-2 mm. longae pedicellis pubescentibus; gluma prima spicula 1/3-1/2 brevior, acuta, 5-nervis; fructus 1-1.1 mm. longus, albus, nitidus, summo minute hispidulus.

Perennial; culms tufted, erect, 90 cm. tall, glabrous, with numerous short internodes toward the base; sheaths, at least the lower, much overlapping, glabrous; ligule 0.2 mm. long, minutely ciliate; blades firm, strongly nerved, flat below becoming involute toward the tip, as much as 25 cm. long, 3 mm. wide, minutely pubescent on the upper surface toward the base, otherwise glabrous; spikelets 1.8-2 mm. long, glabrous, minutely pubescent toward the tip, or glabrous, the pedicels usually shorter than the spikelets, pubescent with spreading hairs; first glume 1/2 to 2/3 as long as the spikelet, acute, 5-nerved; second glume and sterile lemma equal, strongly 5-7-nerved; fruit 1-1.1 mm. long, elliptic, white, smooth and shining, minutely hispidulous at the tip.

Type in the U. S. National Herbarium, No. 2208531, collected in marichal at northwest base of Cerro Gavilan (Cerro Carichana), Bolívar, Venezuela, 100 meters altitude, December 21, 1955, by John J. Wurdack & J. V. Monachino (No. 40894).

New Species of Olyra

OLYRA WURDACKII Swallen, sp. nov.

Culmi simplices, 3.3 m. alti, glabri, nodis barbatis pilis appressis; laminae 15-26 cm. longae, 5 cm. latae, glabrae; panicula 27 mm. longa, ramis numerosis, appressis, verticillatis; spiculae masculae 8-10 mm. longae, acuminatae vel attenuatae, glabrae, appressae; spiculae femineae 7-8 mm. longae, pilosae, glumis acuminatis, non aristatis; fructus 5 mm. longus, albus, lucidus.

Culms simple, 3.3 m. tall, glabrous, with dense bands of white appressed hairs at the nodes; sheaths all much shorter than the internodes, glabrous; blades 15-26 cm. long, about 5 cm. wide, rounded at the base, scarcely petiolate, with a few stiff hairs on the margins near the base, glabrous on both surfaces; panicle 27 cm. long, composed of numerous

appressed verticillate branches, making a dense mass of almost entirely staminate spikelets; branches 10-18 cm. long, ascending or appressed, densely villous in the axils; staminate spikelets 8-10 mm. long, acuminate or attenuate, glabrous; appressed; pistillate spikelets 2 or 3 at the ends of the branches, 7-8 mm. long, the glumes acuminate but not awned, pilose; fruit 5 mm. long, white, smooth and shining.

Type in the U. S. National Herbarium, Nos. 2307269 and 2307270, collected at edge of open rock on crystalline dome on right bank of Río Siapa just below Raudal Gallineta, Territory Amazonas, Venezuela, altitude 300-500 meters, July 21, 1959, by John J. Wurdack & L. S. Adderley (No. 43540).

OLYRA MARANONENSIS Swallen, sp. nov.

Culmi erecti, 85-90 cm. alti, glabri; laminae 19-22 cm. longae, 3-4 cm. latae, glabrae, nitidae; paniculae 13 cm. longae ramis erectis vel adscendentibus inferioribus usque ad 5 cm. longis; spiculae masculae 2.5-3.5 mm. longae, acuminatae, pilosae; spiculae femineae 10-13 mm. longae; gluma arista flexuosa 8-12 mm. longa; fructus 8 mm. longus, marginibus dense villosus.

Culms erect, 85-90 cm. tall, glabrous; lower sheaths distant, glabrous, much shorter than the internodes, the upper overlapping with well-developed blades; blades 19-22 cm. long, 3-4 cm. wide, asymmetrical oblique at the base, glabrous, glossy; panicles 13 cm. long, with slender erect or ascending branches, the lower as much as 5 cm. long; staminate spikelets 2.5-3.5 mm. long, acuminate or awn-pointed, pilose, distant and short-pedicelled on the longer branches, sometimes terminating a shorter branch; stamens 3, white, 2 mm. long; pistillate spikelets solitary on the ends of a few of the upper branches, 10-13 mm. long, the first glume merging into a flexuous awn 8-12 mm. long; fruit 8 mm. long, densely villous on the margins at the base, the margins near the summit less villous, but distinctly so; palea acuminate, as long as the lemma.

Type in the U. S. National Herbarium, No. 2382316, collected in rainforest on ridge crest of Quebrada Chuivi, valley of Río Marañón near Cascades de Mayasi, elevation 500-550 m., Amazonas, Peru, September 20, 1962, by John J. Wurdack (No. 1936).

OLYRA TAQUARA Swallen, sp. nov.

Culmi validi, erecti, ca. 2.5 m. alti, nodis ramosi; laminae 25-35 cm. longae, 6-7 cm. latae, subcordatae, petiolatae, glabrae, marginibus scabris; paniculae 12-17 cm. longae, ramis adscendentibus vel divergentibus, subverticillatis; spiculae masculae

8-10 mm. longae, breviaristatae; spiculae femineae 2-2.8 cm. longae; fructus 8 mm. longus, cylindricus, glabrous.

Perennial; culms stout, erect, about 2.5 m. tall, branching at the upper nodes; lower sheaths bladeless much shorter than the internodes with short stiff appressed hairs above the nodes, crowded upward; blades 25-35 cm. long, 6-7 cm. wide, somewhat cordate at the base, petiolate, glabrous on both surfaces, the margins very scabrous; panicles 12-17 cm. long, the branches stiffly ascending or spreading, roughly verticillate, the upper ones solitary, scattered; staminate spikelets appressed to branches, 8-10 mm. long including the short awn, glabrous, the stamens 4 mm. long; pistillate spikelets 2 or 3 at the ends of the branches, 2-2.8 cm. long including the awns, the body of the glume 8-12 mm. long; fruit about 8 mm. long, slender, cylindric, glabrous.

Type in the U. S. National Herbarium, No. 2434254, collected in swamp forest at Riberão Grande, Municipio Jataí, Goiás, Brazil, July 25, 1956, by A. Macedo (No. 4386).

Also collected in the same locality Macedo 4380. The second specimen is undoubtedly the same species but the blades are all much smaller, not more than 14 cm. long and 3 cm. wide.

A New Species of Imperata

IMPERATA FLEXUOSA Swallen, sp. nov.

Culmi erecti, 120 cm. alti, rhizomatibus prominentibus; laminae usque ad 80 cm. longae, 1 cm. latae, ad basim attenuatae, glabrae; panicula 55 cm. longa, erecta vel pendula, ramis in fasciculis remotis, flexuosis, inaequalis, 1-12 cm. longis basi nudis; spiculae 3-4 mm. longae; glumae et callus pilis 10-12 mm. longis.

Culms erect from deep prominent rhizomes, 120 cm. tall; lower sheaths becoming fibrous with age, the upper ones much longer than the internodes, glabrous or somewhat pilose near the summit; blades as much as 80 cm. long, attenuate, long-narrowed to the base, as much as 1 cm. wide, glabrous, the margins ciliate for as much as 10 cm.; panicle 55 cm. long, erect or nodding, the axis slender, the branches in distant groups, few-flowered, slender, flexuous, of unequal length, 1-2 cm. to as much as 12 cm. long, naked at the base, with a few long hairs in the axils of the branches and branchlets; spikelet 3-4 mm. long with hairs about 10-12 mm. long on the callus and glumes.

Type in the U. S. National Herbarium, No. 1913732, collected "En conucos. Kavanoyen. Selva de Oparuma. Guayana Venezolana" Venezuela, May 30, 1946, by T. Lasser (No. 1886).

Eriochrysis

Spikelets not crowded, not greatly obscured by the hairs.
  Spikelets ovate-acute.
    Panicles 8-14 cm. long, spikelike, the racemes appressed; spikelets 5-6 mm. long. 1. E. holcoides
    Panicles 17-22 cm. long, not spikelike, the racemes ascending; spikelets 4-5 mm. long. 2. E. warmingiana
  Spikelets usually obovate, rounded or blunt at the summit..... 3. E. laxa
Spikelets crowded, mostly obscured by the hairs.
  Hairs of the spikelets light brown or tan; spikelets not glomerate.
    Glumes or at least most of them irregularly lobed, obtuse, foliage glabrous.. 4. E. glabrifolia
    Glumes acute; foliage densely appressed villous. 5. E. villosa
  Hairs of spikelets dark brown; spikelets usually dense, glomerate..... 6. E. cayennensis

1. ERIOCHRYSIS HOLCOIDES (Nees) Kuhlm. Comm. Linhas Telegraph. Estrat. Matto Grosso 67: 89. Annexo 5, Bot. 11: 89. 1922.

Saccharum holcoides Hack. in Mart. Fl. Bras. 2(3): 254. 1883.

Anatherum holcoides Nees, Agrost. Bras. 324. 1829.

Specimens examined: Brazil: Paraná: Pinhoes, Dusén 8927, 15820; Curitiba, Swallen 8526; Tabatinga, Hatschbach 6313. Santa Catarina: Santo Cecelia, Reitz & Klein 13480, 13505; Rio dos Patos, Lebon Regis, Reitz & Klein 13837; Matos Costa, Reitz & Klein 13720, 13742; Serra da Boa Vista, São José, Reitz & Klein 5417, 10247; Serra do Oratorio, S. Joaquim; Campo Alegre, Smith & Klein 7467; Reitz & Klein 5338, 10114; Campo dos Padres, Smith, Reitz & Klein 7764; Reitz 2710; Mafra, Smith & Klein 10668. Rio Grande do Sul: D. Petrolini, Swallen 7307; Vacaria, Swallen 8214; São Francisco de Paula, Rambo 54, 574.

2. ERIOCHRYSIS WARMINGIANA (Hack.) Kuhlm. Comm. Linhas Telegraph. Estrat. Matto Grosso 67: 29. 1912.

Saccharum warmingiana Hack. in Mart. Fl. Bras. 2(3): 254. 1883.

Specimens examined: Bolivia: Santa Cruz: Buena Vista, Steinback 7032. Brazil: Mato Grosso: Aquidauana, Chase 11063; Swallen 9533.

3. ERIOCHRYSIS LAXA Swallen, sp. nov.

Culmi caespitosi, erecti, 130 cm. alti, nodis pilosis; vaginae glabrae; ligula 1 mm. longa, minute ciliata; laminae planae, eae innovationum filiformes usque ad 45 cm. longae et 2 mm. latae, glabrae, eae culmorum usque ad 60 cm. longae et 4 mm. latae, superiores multo breviores usque ad 6 mm. latae, supra dense pilosa; inflorescentia 22 cm. longa, 2 cm. lata; spiculae sessiles ca. 4 mm. longae, obovatae, glabrae, marginibus pilis 3 mm. longis; gluma secunda angusta marginibus supra ciliata; lemma sterile hyalinum, marginibus pauciciliatum.

Culms densely tufted, erect, 130 cm. tall, glabrous, the nodes appressed-pilose; sheaths all longer than the internodes, glabrous; ligule about 1 mm. long, minutely erose or ciliate; blades of innovations as much as 45 cm. long, subfiliform below, sometimes broadened above to as much as 2 mm., glabrous, those of the culm as much as 60 cm. long and 4 mm. wide, the upper ones much shorter as much as 6 mm. wide, densely pilose on the upper surface; inflorescence 22 cm. long, 2 cm. wide, interrupted below, the axis and branches glabrous; sessile spikelets about 4 mm. long, usually obovate, the tip rounded, the margins bearing hairs as much as 3 mm. long, the back glabrous, papillate-roughened; second glume narrow, the margins ciliate in the upper half; sterile lemma hyaline, sparingly ciliate on the margins with relatively strong hairs.

Type in the U. S. National Herbarium, No. 1256173, collected in wet ground near streamlet, Lauras, Minas Gerais, Brazil, March 5, 1925, by Agnes Chase (No. 8729).

It is possible that this is the taxon described by Hackel as Eriochrysis cayennensis var. laxiuscula. The description is too insufficient to be sure of it, and no type was found in Europe by Mrs. Chase or Prof. Hitchcock. It seems better then, to describe it as a distinct species.

Additional material examined: Colombia: Mutis 5471. Bolivia: Santa Cruz, Steinback 6975 bis. Paraguay: Lacus Ypacaray, Hassler 12492; Posta Ibihená, Rojas 13307. Argentina: Prov. Corrientes: Estancia Santa Teresa, Petersen 1713; Prov. Misiones: Posadas, Ekman 526. Brazil: Paraná: Curitiba, Swallen 8513; Londrina, Swallen 8728; São Paulo: Pindorama, Viegas 3381; Pickel s.n.; Minas Gerais: Glaziou 17889a; Uberlandia, Chase 11254; Lavras, Chase 8729; Juiz de Fóro, Chase 8603; Goias: Rio dos Bois, Chase 11675; Anapolis, Chase 11365; Santo Rita do Araguaya, Chase 12038, 12039; Rio Verde, Chase 12089; Mato Grosso: Dourados, Chase 10945, 10956; Campo Grande, Gehrt 114.

4. ERIOCHRYSIS GLABRIFOLIA Swallen, sp. nov.

Culmi dense caespitosi, erecti, ca. 90 cm. alti, glabri, nodis pubescentibus; vaginae glabrae vel summo pilosae; ligula ca. 1 mm. longa; innovationum laminae usque ad 40 cm. longae, 1-2 mm. latae, eae culmorum 4-6 mm. latae supra ligulam pilosae; inflorescentia 16 cm. longa, 5-10 mm. lata, densa, spiculae sessiles 3 mm. longae, obovatae; gluma prima dorso glabra, marginibus pauciciliata, summo dense hispida; spiculae pedicellatae ca. 1.8 mm. longae; lemma fertile ca. 2 mm. longum.

Perennial; culms densely tufted, erect, about 90 cm. tall, glabrous, the nodes appressed pubescent; sheaths longer than the internodes, rounded on the back, glabrous, or pilose near the summit; ligule 1 mm. long, short-pilose at the tip; blades of innovations as much as 40 cm. long, narrow, not more than 1 mm. wide or widened above to 2 mm., those of the culm not so narrow at the base, 4-6 mm. wide toward the ends, densely pilose above the ligule, otherwise glabrous; inflorescence partly enclosed in the sheath, 16 cm. long, 5-10 mm. wide, dense; sessile spikelets 3 mm. long, obovate; first glume glabrous on the back, more or less ciliate on the margins, with dense tuft of hairs at the tip; pedicellate spikelet about 1.8 mm. long, densely hairy at the tip and on the margins; fertile lemma about 2 mm. long.

Type in the U. S. National Herbarium, No. 1960865, collected in banhado, Estacão Experimental, Ponta Grosso, Paraná, Brazil, January 28, 1946, by Jason R. Swallen (No. 8296).

Additional specimens examined: Brazil: Paraná: Guarapuava, Swallen 8803. Santa Catarina: Curitibanas, Reitz & Klein 11806; Smith 11103; Indios, Smith 11220.

5. ERIOCHRYSIS VILLOSA Swallen, sp. nov.

Culmi dense caespitosi, erecti, ca. 1 m. alti, glabri, nodis villosis; vaginae dense villosae; ligula ca. 1 mm. longa; laminae planae, 14-30 cm. longae, 5-8 mm. latae, firmae, dense villosae, suprema reducta; inflorescentia 22 cm. longa, densa, axi et ramis villosis; spiculae 3-4 mm. longae; gluma prima marginibus villosa pilis 2-3 mm. longis; gluma secunda summo et marginibus pilosis; lemma fertile 2 mm. longum marginibus pauciciliatum.

Culms densely tufted, erect, about 1 m. tall, glabrous, the nodes distinctly appressed villous; sheaths densely ascending or appressed villous, usually longer, occasionally a little shorter, than the internodes; ligule about 1 mm. long, obscurely ciliate; blades flat, 14-30 cm. long, 5-8 mm. wide, firm, densely appressed-villous, the uppermost reduced;

inflorescence 22 cm. long, dense, somewhat interrupted below, the axis and branches appressed-villous; spikelets 3-4 mm. long, not more than 1 mm. wide; first glume villous on the margins, especially at the summit, the hairs 2-3 mm. long, the back glabrous; second glume pilose at the summit on the margins with a few long hairs intermixed; sterile lemma a little shorter than the glume, acute, hyaline pilose on the margins at the summit; fertile lemma 2 mm. long, sparsely ciliate on the margins.

Type in the U. S. National Herbarium, No. 1961568, collected in banhado, Rio Caçador, Santa Catarina, Brazil, January 21, 1946, by Jason R. Swallen (No. 8237).

Additional material examined: Brazil: Santa Catarina: Lages, Swallen 8125; Smith 12242; Reitz 6456. Rio Grande do Sul: Jaquirana, Rambo 52049; Cambara, Rambo 36476.

6. ERIOCHRYSIS CAYENNENSIS Beauv. Ess. Agrost. 8. pl. 4. f. 11. 1812.

This is the most widespread of all the species of Eriochrysis. It ranges from Mexico and the West Indies to Bolivia and Argentina. It is composed of several elements, none of which can be separated satisfactorily with the material available.

Erianthus

Nodes conspicuously bearded.
  Glumes entirely glabrous; spikelets 3.5-4 mm. long; sterile lemma and lemma glabrous.
    1. E. asper
  Glumes villous across the back or ciliate on the margins only. Spikelets 6-8 mm. long; sterile lemma and lemma ciliate.
    Glumes villous across the back; culms usually 2-3 m. tall; panicle large, dense, pale, many-flowered..... 2. E. trinii
    Glumes ciliate on the margins; culms less than 2 m. tall, usually not much more than 1 m. tall; panicles small, relatively few-flowered, tinged with purple.
      Sterile lemma and lemma ciliate, acute; blades narrow, not much widened above.
        3. E. purpureus
      Sterile lemma and lemma villous on the back, the sterile lemma awned; blades broadened above, as much as 14 mm. wide.
        4. E. biaristatus

Nodes glabrous or only obscurely bearded, the hairs, if any, very short.
  Panicles exserted.

Culms glabrous below the panicle.
5. E. angustifolius
Culms villous below the panicle.
1. E. asper
Panicles entirely or only partly included in the sheath; callus hairs longer than the spikelet.
Culms stout; inflorescence included only at the base; sterile lemma and lemma ciliate.
6. E. glabrinodis
Culms relatively slender; inflorescence usually entirely enclosed in the upper sheath; sterile lemma and lemma glabrous.
7. E. clandestinus

1. ERIANTHUS ASPER Nees, Agrost. Bras. 315. 1829.
Type: Brazil: "Habitat in ripa fluminis S. Francisci pone Salgado, et alibi in prov. Minarum."

2. ERIANTHUS TRINII Hack. in DC. Monogr. Phan. 6: 135. 1889.
E. saccharoides spp. genuinus var. trinii in Mart. Fl. Bras. 2(3): 258. 1883.

3. ERIANTHUS PURPUREUS Swallen, sp. nov.
Culmi plerumque ca. 1 m. alti, infra inflorescentia appresso-hispidi, nodis barbatis; laminae angustae; spiculae 7-8 mm. longae; gluma et lemmata marginibus ciliata.
Culms erect, usually about 1 m. tall, appressed-hispid below the inflorescence, the nodes bearded; blades narrow, not much widened above; inflorescence small exserted, usually purple, distinctly appressed-hispid; spikelets 7-8 mm. long, the glumes ciliate on the margins; sterile and fertile lemma ciliate, acute.
Type in the U. S. National Herbarium, No. 1960827, collected in banhado, near Curitiba, Paraná, Brazil, by Jason R. Swallen (No. 8573).
Additional specimens examined: Brazil: Paraná: Campo Largo, Swallen 8581; Curitiba, Swallen 8532; Mun. Cerro Azul, Hatschbach 8310; Banhado-Piroquara, Swallen 8653; Pirahy, Dusén (Mus. Nat. R. Janeiro 4274); Santa Catarina: Lages, Swallen 8177, 8066; Curitibanos, Klein 3346; Mun. Chapeco, Smith & Klein 11627; Mun. P. União, Smith & Reitz 8624. São Paulo: Campo Grande, Kuhlmann. Minas Gerais: Hargreaves, Chase 10257. Rio Branco: Serra Tepequem, Maguire & Maguire 40059.

4. ERIANTHUS BIARISTATUS (Hack.) Swallen, comb. nov.
E. saccharoides ssp. angustifolius var. biaristatus Hack. in Mart. Fl. Bras. 2(3): 258. 1883.

Specimens examined: Brazil: Goiás: Chapadinha, Glaziou 22380. Paraná: Pinháes, Dusén 8919. Santa Catarina: Santa Cecilia, Reitz & Klein 14140. São Paulo: Fazenda Campinha, NW of Moji-Mirim, Eiten 1545. Bolivia: Nor Yungas, Hitchcock 22737; White 1208.

5. ERIANTHUS ANGUSTIFOLIUS Nees, Agrost. Bras. 316. 1829.

Type: "...ad flumen Rio Grande do Sul dictum prope fines regni Paraguayani. (Sellow)..."

6. ERIANTHUS GLABRINODIS (Hack.) Swallen, comb. nov.

E. saccharoides ssp. genuinus var. trinii subv. glabrinodis Hack. in Mart. Fl. Bras. 2(3): 258. 1883.

E. trinii subv. glabrinodis Hack. in DC. Monogr. Phan. 6. 135. 1889.

Specimens examined: Brazil: Rio Grande do Sul: S. Leopoldo, Dutra 560; Passo Fundo, Fazendo da Brigada, Swallen 7781. São Paulo: Ypiranga, Usteri. Minas Gerais: Ouro Preto, Chase 9373; Juiz de Fóra, Chase 8604.

7. ERIANTHUS CLANDESTINUS Swallen, sp. nov.

Culmi graciles, glabri; inflorescentia in vagina inclusa; glumae villosae; lemmata sterile et fertile glabra.

Culms slender, glabrous; inflorescence included in the upper sheath; glumes villous across the back; sterile and fertile lemmas glabrous, entire.

Specimens examined: Brazil: Paraná: Ponta Grosso, Swallen 8467; Curitiba, Dusén 13843; Campo Grande, Dusén 4214. Santa Catarina: Bom Retiro, Reitz 2874; Porto União, Reitz & Klein 12828; Smith & Klein 10722, 12170; Curitibanos, Reitz & Klein 11783; Smith & Klein 12192; Campos Novos, Reitz & Klein 14658; Rio Caçador: Swallen 8255. Rio Grande do Sul: Porto Alegre, Rambo 41390; Beetle 1562; Pelotas, Sacco 313; Mun. Rio Pardo, Jurgens G63. Rio de Janeiro: Chase 8228; Lutzelburg 9. Mato Grosso: Dourados, Chase 10968.

New Species of Trachypogon

TRACHYPOGON RIGIDIFOLIUS Swallen, sp. nov.

Culmi erecti, 75 cm. alti, glabri, rhizomatosi; ligula ca. 1 mm. longa; laminae involutae, erectae, attenuatae 12-18 cm. longae, dense hispidae; spicula fertilis 10 mm. longa, callo 3 mm. longo dense hispido; gluma prima brevihispida; arista 9-10 cm. longa, 2-geniculata, hispida pilis 1-1.5 mm. longis.

Perennial; culms erect from prominent rhizomes, 75 cm. tall, glabrous, the nodes short appressed hispid;

sheaths all longer than the internodes, appressed hispid; ligule inconspicuous, less than 1 mm. long; blade erect, curved, involute, attenuate, 12-18 cm. long, densely hispid on both surfaces, becoming flat with age as much as 3 mm. wide; fertile spikelet 10 mm. long, the callus 3 mm. long, densely hispid; first glume evenly hispid, the hairs short; awn 9-10 cm. long, 2-geniculate, hispid, the hairs 1-1.5 mm. long; staminate spikelet about 8 mm. long, hispid like the fertile spikelet.

Type in the U. S. National Herbarium, No. 1961900, collected on campo, Fazenda de Criacão, Ponta Grossa, Paraná, Brazil, February 6, 1946, by Jason R. Swallen (No. 8488).

TRACHYPOGON DENSUS Swallen, sp. nov.

Culmi dense caespitosi, erecti, 60-90 cm. alti, nodis hispidis; ligula ca. 2 mm. longa; laminae involutae (vel planae), attenuatae, glabrae, 10-25 cm. longae, 2 mm. latae; racemus solitarius, 5-9 cm. longus; spicula fertilis 9 mm. longa, callo 2 mm. longo; gluma prima sparse pilosa vel hispida; arista 2.8-4 cm. longa, hispida pilis 1-1.5 mm. longis.

Perennial; culms densely tufted, erect, 60-90 cm. tall, glabrous, the nodes appressed hispid; sheaths mostly longer than the internodes, the upper ones much longer, glabrous or sparsely hispid near the summit; ligule inconspicuous, about 2 mm. long; blades mostly involute, or becoming flat with age, erect, attenuate, glabrous, 10-25 cm. long, 2 mm. wide; racemes solitary, erect, long-exserted, 5-9 cm. long; fertile spikelet 9 mm. long, dark brown, the callus 2 mm. long; first glume sparsely pilose or hispid; awn 2.8-4 cm. long, hispid to the second bend with hairs 1-1.5 mm. long; sterile spikelets 7 mm. long, sparsely pilose or hispid.

Type in the U. S. National Herbarium, No. 1961886, collected in campo, Fazenda de Criacão, Lages, Santa Catarina, January 4, 1946, by Jason R. Swallen (No. 8139).

TRACHYPOGON PARVIFLORUS Swallen, sp. nov.

Culmi erecti, 60-70 cm. alti, nodis barbatis; ligula 3-10 mm. longa, decurrens; laminae angustae, rigidae, summo usque ad 3 mm. latae; racemi 1-3, flexuosi, 7-12 cm. longi; spicula fertilis 7.5 cm. longa, callo 2 mm. longo dense barbato; gluma prima hirsuta pilis usque ad 3 mm. longis; arista 4 cm. longa, gracilis, 2-geniculata, hispida.

Perennial; culms erect, 60-70 cm. tall, glabrous, the nodes bearded to almost glabrous; sheaths glabrous, sparsely hispid on the collar, the uppermost nearly bladeless; ligule 3-10 mm. long, decurrent;

blades narrow in the lower part, stiff and rigid, becoming flat, as much as 3 mm. wide toward the ends; inflorescence long-exserted, composed of 1-3 flexuous racemes 7-12 cm. long; fertile spikelet 7.5 mm. long, the callus 2 mm. long, densely barbate in the center; first glume conspicuously hirsute, the hairs longer near the summit, as much as 3 mm. long; awn 4 cm. long, slender, weakly 2-geniculate, the first two segments hispid, the terminal obscurely so; staminate spikelet 6 mm. long, the hairs not as long as on the fertile spikelet.

Type in the U. S. National Herbarium, No. 2011555, collected on dry plains, Itapicuru, Bahia, Brazil, October 1949, by G. Pinto (No. 0193).

New Species of Sorghastrum

SORGHASTRUM AMPLUM Swallen, sp. nov.

Culmi 1.4 m. alti, glabri; ligula 3-4 mm. longa, firma; laminae planae usque ad 60 cm. longae, 7 mm. latae, glabrae; inflorescentia 35 cm. longa, ramis adscendentibus usque ad 12 cm. longis, glabris; spiculae 6-6.5 mm. longae; gluma prima villosa, 9-nervis; lemma fertile angustissimum, obscure ciliatum, bifidum, arista 2-geniculata, 2.6 cm. longa, parte secunda villosa.

Perennial; culms 1.4 m. tall, glabrous, or obscurely pubescent at the nodes; sheaths glabrous, the lower shorter, the upper longer than the internodes; ligule 3-4 mm. long, firm; blades flat, as much as 60 cm. long, 7 mm. wide, glabrous; inflorescence 35 cm. long, the main axis glabrous or nearly so, with ascending branches, the lower ones as much as 12 cm. long, becoming gradually shorter to the tip of the inflorescence, glabrous, the pedicels obliquely jointed; spikelets light tan, 6-6.5 mm. long, the first glume 9-nerved, villous with white hairs, the second glume 5-nerved, glabrous; sterile lemma very thin, narrow, ciliate on the keels nearly to the base; fertile lemma very narrow, obscurely ciliate, bearing an awn from between two teeth, the awn 2-geniculate, 2.6 cm. long, distinctly pilose on the second segment; sterile pedicels 2/3-3/4 as long as the spikelet, very densely villous with white silky hairs.

Type in the U. S. National Herbarium, No. 1128238, collected on open hills, São João, São Paulo, Brazil, March 19, 1922, by E. W. D. Holway and Mary M. Holway (No. 1658).

This species is allied to Sorghastrum stipoides, but differs in having a much larger panicle, larger and narrower spikelets, and a much longer awn. The hairs on the sterile pedicel are much denser and more silky. One specimen matches the type almost exactly,

collected at Tremembe, São Paulo, by E. W. D. Holway and Mary M. Holway. The fact that these two specimens were collected at different localities and at widely separated times, points to their being a distinct taxa.

SORGHASTRUM CHASAE Swallen, sp. nov.

Culmi scandentes, 3 mm. longi, ramosi; ligula firma, 5 mm. longa; laminae 25-45 cm. longae, usque ad 2 cm. latae, scabrae, infra pubescentes, marginibus scabrissimae; inflorescentia 20-30 cm. longa, ramis adscendentibus summo hispidis; spiculae 4.5-5 mm. longae; gluma prima manifesto hispida, 9-nervis; lemma fertile, angustissimum, arista bigeniculata 2.5 cm. longa.

Annual?; culms clambering in small tree, 3 m. high, branching, rooting at the lower nodes, glabrous; sheaths all shorter than the internodes, glabrous; ligule firm, indurate, about 5 mm. long; blades 25-45 cm. long, as much as 2 cm. wide, finely scabrous on both surfaces, pubescent below, the margins very scabrous; inflorescence 20-30 cm. long, the branches ascending, not very dense, the tip of the branches and branchlets hispid; spikelets 4.5-5 mm. long, green, the first glume 9-nerved, conspicuously hispid, the second glume 5-nerved, glabrous; sterile lemma thin, hyaline, pilose on the margins; fertile lemma very narrow, glabrous, bearing a relatively stout 2-geniculate awn 2.5 cm. long.

Type in the U. S. National Herbarium, No. 1501345, collected in sandy cerrado, Santa Rita do Araguaya, Mato Grosso, Brazil, April 5-6, 1930, by Agnes Chase (No. 11861).

This species is related to Sorghastrum scaberrima as indicated by the hispid ends of the panicle branches, but differs in being much larger with broad flat blades and is apparently annual rather than perennial.

SORGHASTRUM FLEXUOSUM Swallen, sp. nov.

Culmi dense caespitosi, erecti, 80 cm. alti; ligule 2-3 mm. longa, decurrens; laminae usque ad 20 cm. longae, infra angustae, 3-4 mm. latae, attenuatae, tenuiter scabrae; inflorescentia ca. 20 cm. longa, ramis adscendentibus summo prominente hispidis; spiculae 4.5 mm. longae; gluma prima hispida, 6-nervis; lemma fertile marginibus minute ciliatum; arista 2-geniculata ca. 15 mm. longa.

Perennial; culms densely caespitose, erect, 80 cm. tall; sheaths all longer than the internodes, glabrous; ligule 2-3 mm. long, decurrent, firm; blades up to 20 cm. long, narrowed below, widened above to 3-4 mm., attenuate, smooth to the touch, but

finely scabrous on both surfaces and on the margins; inflorescence about 20 cm. long, the flexuous branches ascending, prominently hispid at the ends, rather loosely flowered, glabrous or nearly so in the axils; spikelets 4.5 mm. long, medium brown, the first glume hispid, 6-nerved, the second glume glabrous, 5-nerved; sterile lemma very thin, hyaline, minutely ciliate on the margins in the upper half; fertile lemma sparsely and minutely ciliate on the margins, bearing a 2-geniculate awn about 15 mm. long.

Type in the U. S. National Herbarium, No. 2252125, collected on campo, Fazenda Ernesto Schiede, Campo Alegre, Santa Catarina, Brazil, by R. Reitz & R. Klein (No. 5347).

The following specimens, although they are somewhat variable, apparently belong to this species: Brazil: Paraná: Guarapuava, Swallen 8862, 8900; Santa Catarina: Porto União, Smith & Klein 10771; Campo Alegre, Smith & Klein 7490, 8531; Lages, Swallen 8141; Smith & Klein 8131; Curitibanos, Smith & Klein 8291; São Joaquin, Reitz & Klein 7416, 7454, 7763, 8156; Bom Retiro: Reitz & Klein 5485; Rio Grande do Sul: Vacaria, Herb. Bradeanum 21611.

SORGHASTRUM RIGIDIFOLIUM Swallen, sp. nov.

Culmi erecti, 1.5 m. alti, glabri; ligula firma, 1-3 mm. longa; laminae 25-30 cm. longae, 3 mm. latae, infra angustae, glabrae; inflorescentia 30 cm. longa, ramis flexuosis, glabris, paucifloris; spiculae 5.5-6 mm. longae; gluma prima sparse hispida, 9-nervis; lemma fertile angustissimum, bifidum, arista 2-geniculata 15 mm. longa.

Perennial; culms erect, 1.5 m. tall, glabrous; sheaths elongate, longer than the internodes, glabrous; ligule firm, indurate, 1-3 mm. long; blades 25-30 cm. long, firm, erect, narrowed below, thick, expanded above to 3 mm. wide, glabrous, obscurely scabrous on the margins; inflorescence about 30 cm. long, the slender branches flexuous, glabrous, or sparsely hispid, few-flowered, the axis pubescent or pilose at the nodes; spikelets light brown, 5.5-6 mm. long, the first glume sparsely hispid, 9-nerved, the second glume glabrous, 5-nerved; sterile lemma narrow, finely ciliate on the keels above; fertile lemma very narrow, with a stout, 2-geniculate awn 15 mm. long from between the teeth of a bifid apex.

Type in the U. S. National Herbarium, No. 2302971, collected in brushy savannas, Herradura, Pinar del Río, Cuba, by E. L. Ekman (Mus. Botan. Stockholm Plantae Indiae Occidentalis, No. 11603).

This species has been erroneously referred to Sorghastrum stipoides (H.B.K.) Hitchc. which grows in South America from Colombia to Brazil and

Argentina. It has denser, less flexuous panicles with smaller spikelets, and the awns are shorter, scarcely more than 1 cm. long. The tip of the panicle branches are also glabrous. All specimens from Cuba assigned to S. stipoides should be referred to S. rigidifolium.

SORGHASTRUM VIRIDE Swallen, sp. nov.

Culmi erecti, 125 cm. alti, glabri, nodis barbatis; ligula 3-4 mm. longa; laminae usque ad 40 cm. longae, 4 mm. latae, planae; inflorescentia 22 cm. longa, ramis brevibus ad basin floriferis; spicula 5.5-6 mm. longa; gluma prima 9-nervis, sparse villosa; lemma fertile angustum, bifidum; arista 15 mm. longa, 2-geniculata.

Perennial; culms erect, 125 cm. tall, glabrous, the nodes appressed-hispid; sheaths all longer than the internodes, the uppermost elongate, glabrous; ligule 3-4 mm. long, the uppermost reduced, firm, rigid, decurrent; blades as much as 40 cm. long, 4 mm. wide, flat, narrowed toward the base; inflorescence 22 cm. long, the short branches floriferous to the base, flexuous, glabrous at the summit; spikelets 5.5-6 mm. long, green, the first glume 9-nerved, sparsely villous, the second glume 5-nerved, glabrous, minutely ciliate on the inturned margins; sterile lemma minutely ciliate in the upper half; fertile lemma narrow, bifid, awned from between the teeth of a bifid apex, the awn 2-geniculate about 15 mm. long; anthers 3 mm. long.

Type in the U. S. National Herbarium, No. 2378565, collected in open sedge meadow, Campos das Sete Lagoas, Municipio de Joji-Guaçu, São Paulo, Brazil, September 20, 1960, by George Eiten & Liene T. Eiten (No. 2336).

Possibly belonging to the same taxa are one specimen collected at Lapa, Paraná (Swallen 8617) and another at Lages, Santa Catarina (Smith 12243).

ADDITIONAL MATERIALS TOWARD A MONOGRAPH OF THE GENUS CALLICARPA. IV

Harold N. Moldenke

CALLICARPA BRACTEATA Dop

Shrub; branches tetragonal, slender, puberulous; petioles 2--3 mm. long; leaf-blades membranous, elliptic-oblong, 7--8 cm. long, 2 cm. wide, acuminate at the apex, serrate along the margins except at the base, long-attenuate and decurrent into the petiole at the base, almost glabrous above except for the venation, sparsely stellate-pilose on the vein and veinlet reticulation beneath and very closely yellow-glanduliferous; midrib slender; secondaries 14--16, very slender, slightly arcuate and ascending; veinlet reticulation hardly conspicuous; cymes lax, dichotomous, many-flowered, 5--6 cm. long, 3--4 cm. wide, puberulous; peduncles 2--2.5 cm. long; bractlets minute; pedicels very short; calyx 1 mm. long, stellate-pubescent, the rim truncate, with 4 very minute teeth; corolla violet, 2.5 mm. long, glabrous and glandulose, the tube dilated, the lobes 4, subequal, 0.5 mm. long, rounded; stamens 4, exserted; filaments inserted at the base of the corolla-tube; anthers slightly glandulose; style equaling the stamens; stigma capitate; ovary villous; drupes white.

The type of this species was collected by Henri François Bon (no. 2659) at Doi Ngang, Tonkin, Indochina. Dop (1932) says "Cette espèce est voisine du C. longifolia Lam. Elle s'en distingue aisément par les pédoncules des cymes beaucoup plus longs, les bractées foliacées. La longueur du pédoncules la rapprocherait du C. longipes Dunn de Chine et de Hongkong; mais les feuilles longuement attenuées, la calice à dents très petites, l'eloignent nettement du C. longipes à feuilles arrondies ou cordées à la base et à calice divisé jusqu'au milieu."

Nothing is known to me of this taxon besides what is stated in the literature.

CALLICARPA BREVIPES (Benth.) Hance, Ann. Sci. Nat., ser. 5, 5: 233. 1866.

Additional & emended synonymy: Callicarpa longifolia var. brevipes Benth., Fl. Hongk. 270. 1861. Callicarpa breviceps Hance, Journ. Linn. Soc. Lond. Bot. 13: 116, sphalm. 1873. Callicarpa brevipes Hance apud Maxim., Mél. Biol. 12: 509. 1886. Callicarpa longifolia Hook. apud P'ei, Mem. Sci. Soc. China 1 (3): 45, in syn. 1932 [not C. longifolia Auct., 1965, nor Benth., 1966, nor Blume, 1936, nor Hance, 1932, nor Hemsl., 1916, nor L., 1820, nor Lam., 1783, nor Roxb., 1827, nor Vahl, 1936]. Callicarpa japonica var. dichotoma Bakh. apud P'ei, Mem. Sci. Soc. China 1 (3): 45, in syn. 1932. Callicarpa brecipes (Benth.) Hance apud P'ei, Mem. Sci. Soc. China 1 (3): 48, sphalm. 1932. Callicarpa brenipes Hance ex Moldenke, Résumé Suppl. 14: 6, in syn. 1966.

Bibliography: Lindl., Bot. Reg. 10: pl. 864. 1824; Hook., Exot. Fl. 2: pl. 133. 1825; Benth., Fl. Hongk. 270. 1861; Hance, Ann. Sci. Nat., ser. 5, 5: 233. 1866; Hance, Journ. Linn. Soc. Lond. Bot. 13: 116. 1873; Maxim., Bull. Acad. Sci. St.-Pétersb. 31: 77—78. 1886; Maxim., Mél. Biol. 12: 504, 507, & 509. 1886; Forbes & Hemsl., Journ. Linn. Soc. Lond. Bot. 26: 525. 1890; Jacks. in Hook. f. & Jacks., Ind. Kew. 1: 386. 1893; Dunn, Kew Bull. Misc. Inf. 1912: 368. 1912; Dunn & Tutcher, Kew Bull. Misc. Inf. Addit. Ser. 10: 202 & 203. 1912; Lévl., Cat. Pl. Yun-Nan. 277. 1917; Bakh., Bull. Jard. Bot. Buitenz., ser. 3, 3: 25 & 26. 1921; Chung, Mem. Sci. Soc. China 1 (1): 225. 1924; E. D. Merr., Lingnan Sci. Journ. 5: 157. 1927; P'ei, Mem. Sci. Soc. China 1 (3): [Verbenac. China] 16, 45—46, 48, 50, & 56. 1932; P. Dop, Bull. Soc. Hist. Nat. Toulouse 64: 499—501, 507, & 510—512. 1932; Moldenke in Fedde, Repert. Spec. Nov. 39: 297 & 299 (1936) and 40: 92—93, 98, 120, & 129. 1936; Moldenke, Geogr. Distrib. Avicenn. 35. 1939; Moldenke, Prelim. Alph. List Invalid Names 9 & 11. 1940; Moldenke, Known Geogr. Distrib. Verbenac., ed. 1, 56, 58, 59, 71, & 86. 1942; Moldenke, Alph. List Invalid Names 8 & 10. 1942; Moldenke, Alph. List Cit. 2: 558 (1948) and 3: 658, 718, & 932. 1949; Moldenke, Known Geogr. Distrib. Verbenac., ed. 2, 130, 135, 143, 156, & 177. 1949; Moldenke, Phytologia 3: 140 (1949) and 4: 41, 75, & 76. 1952; Moldenke, Biol. Abstr. 26: 1471. 1952; Moldenke, Résumé 167, 173, 174, 187, 213, 241, 245, & 443. 1959; Moldenke, Résumé Suppl. 3: 19 & 30 (1962) and 14: 3 & 6. 1966.

Illustrations: Lindl., Bot. Reg. 10: pl. 864. 1824; Hook., Exot. Fl. 2: pl. 133. 1825.

Hooker's original description (1825) was "Foliis lanceolato-acuminatis superne serratis adultis glabriusculis, pedunculo petiolum paullulum superante.....A shrub, with erect weak branches, which are obscurely four-sided, and clothed, especially the younger ones, with stellated pubescence of which the rays are exceedingly numerous, and such as to give it a mealy appearance to the naked eye. Leaves always opposite, 5 or 6 inches in length, lanceolate, somewhat waved, serrated in the upper part, the extremity acuminated and nearly entire, dark green above, paler beneath, the younger ones covered with a stellated pubescence, the older ones pubescent only on the nerves beneath, all of them petiolated, with the petioles scarcely more than half an inch long. Cymes axillary, small. The peduncles or main stalks scarcely exceeding the length of the petiole, the pedicels short, having minute, linear-lanceolate bracteas at their base. Flowers small, drooping when fully expanded. Calyx small, cup-shaped, with four short and very obtuse teeth. Corolla subcampanulate, 4-lobed, the lobes erecto-patent, of a white colour, fringed with pink. Stamens 4, inserted at the base of the corolla, and exceeding it in length. Filaments white, glabrous. Anthers oblong, yellow. Pistil: germen superior, small, spherical; style about as long as the stamens, filiform, white; stigma obtuse, scarcely capitate. Berries white (Roxb.). Sent to me by Mr. Shepherd as a species of Callicarpa which was received by him from China, and which at present has reached only to a height of two feet in the stove of the Botanic

Garden at Liverpool. It appears to me to agree in almost every particular with the figure and description of the C. longifolia of Lamarck, which that author states to be found in Malacca by Sonnerat. Roxburgh's character, above referred to, described the leaves as long-petioled, and as downy underneath: this latter circumstance I find to exist only in the young leaves; in the older foliage the pubescence, if present, is confined wholly to the veins on the under side. The plant described in the Flora Indica inhabits Prince of Wales Island. Very nearly allied to the present species, as far as I can collect from the characters, are the C. japonica of Thunberg, and the C. purpurea of Jussieu..... But the latter, as described by Dr. Wallich, has leaves only two inches long, while the former has no pubescence, short stamens and style, and an acute stigma: if, too, Thunberg be correct in stating that his C. japonica has 'Filamenta germini inserta', it probably belongs to an altogether different genus."

Hance (1866) says "Pace Schauerii Benthamiique, vera Callicarpa longifolia Lam., quae nullibi in insula Hongkong occurrit, licet a memet prope Cantonem lecta, differt specifice a planta quam pro varietate habat Benthamius, cymis multo majoribus, amplioribus, floribus fructibusque minoribus ramisque glabris. Stirps Hongkongensis est C. brevipes mihi."

Maximowicz (1886) cites: CHINA: Kwangtung: Hance s.n. [prov. Canton]. HONGKONG: Hance s.n., Wright s.n. He comments "Cum Hanceo video: ramos flavido furfuraceo pubescentes, folia haud viscida distanter obiter serrata, cymas fere sessiles, flores pauciores majores, antheras magnas partim tantum exsertas, fructus sphaericos piperiformes. In Callicarpa longifolia Lam. vero rami glabri, folia longiora integra v. mimute serrulata, recentia valde viscida, cymae laxioris pedunculi longiusculi, flores numerosiores triplo minores, antherae late ovales decuplo minores, filamenta capillaria longe exserta, fructus apice plamus plus duplo minor.....Planta hongkongensis a Bentham Callicarpa longifolia var. brevipes dicta sistit Callicarpa brevipedem Hce., de qua atque ejus differentia a Callicarpa longifolia vide infra."

P'ei (1932) describes this plant as follows: "A shrub more or less pubescent or subglabrous. Leaves linear-lanceolate, 9.5 to 21 cm. long, 1.5 to 3.5 cm. wide, subglabrous or pubescent and glandular beneath, glabrous above, entire or crenately serrate, chartaceous, lateral nerves 8 to 10 on each side of the midrib. Petioles nearly none, if present, not exceeding 5 mm. in length. Cymes shortly peduncled; peduncles not exceeding 5 mm. in length. Calyx truncate, with 4 rudimentary teeth, glandular without, glabrous within, about 2 mm. high. Corolla 4-lobed, glandular without, twice as long as the calyx. Stamens 4; filaments just as long as the corolla tube; anthers exserted, oblong, 1.5 mm. in length, connective densely glandular. Style exceeding the stamens, glabrous. Ovary densely glandular. Fruit glandular, about 3 mm. in diameter.....Hooker's description was based on a living plant from China, and he thought that it represented Callicarpa

longifolia Lamarck. Bentham recognized that the plant Hooker described was not Lamarck's species and treated it as a variety brevipes. Hance a few years later raised this to specific rank as Callicarpa brevipes (Benth.) Hance." P'ei also says that C. longissima (Hemsl.) Merr. differs from C. brevipes by having long narrow leaves with the leaf-base attenuate.

Léveillé (1916), in describing his C. mairei, says "Affinis C. Brevipes, a qua distincta foliis frequenter dentatis et floribus lutescentibus". I regard Léveillé's C. mairei as C. bodinieri var. giraldii (Hesse) Rehd. Bakhuizen van den Brink (1921) regards C. brevipes as a synonym of what he calls C. japonica var. dichotoma (Lour.) Bakh. [=C. dichotoma (Lour.) K. Koch].

The C. longifolia of Bentham and of Hance, referred to in the synonymy above, belong to the synonymy of C. longissima (Hemsl.) Merr.; that of Blume, Linnaeus, Roxburgh, and Vahl is C. longifolia Lam.; that of Hemsley and of Diels is, in part, C. bodinieri var. giraldii (Hesse) Rehd. and, in part, C. japonica var. angustata Rehd.

In my 1936 work I regarded C. brevipes f. serrulata P'ei and f. yingtakensis P'ei as synonyms of C. brevipes, but I now regard the former as a distinct form and the latter as a synonym of C. collina Diels.

Collectors describe C. brevipes as a small shrub, 1 m. tall, the flowers pink, the young fruit green, growing in grasslands and open thickets, flowering in September, fruiting in August and September. They record the vernacular name "mata poene". The boundaries between the typical form of the species and its several named forms are very obscure and ill-defined. I also have doubts whether this very narrow- almost sessile-leaved taxon is the original of Bentham, who compared his plant with C. longifolia of Lamarck. Bentham's type must be seen in order to clarify this point.

Material has been misidentified and distributed in herbaria under the names C. brevipetiolata Merr., C. eriophylla Ridl., and C. longifolia Lam. On the other hand, the Clemens & Clemens 4499 & 5055, distributed as C. brevipes, are actually C. brevipes f. annamensis Moldenke [the first-mentioned number being the type collection], W. Y. Chun 6803, R. C. Ching 2105, F. A. McClure 2664 [Herb. Canton Chr. Coll. 9222], and Peng, Tak, & Kin 296 [Herb. Canton Chr. Coll. 12295] are C. brevipes f. serrulata P'ei [the second and third being cotype collections; the last-mentioned being a cotype collection of f. subglabra P'ei]; Herb. Canton Chr. Coll. 12295 & 12556 are C. longissima (Hemsl.) Merr. [both being cotype collections of C. brevipes f. subglabra P'ei]; and R. C. Ching 1760 is C. rubella var. dielsii (Lévl.) Li [the type collection of C. rubella var. hemsleyana f. subglabra P'ei].

Forbes & Hemsley (1890) cite Champion s.n., Hance s.n., Wilford

s.n., and C. Wright s.n. from Hongkong, deposited in the Kew and British Museum herbaria. P'ei (1932) cites Chen 5005, 5307, & 5648 from Szechuan, China.

In all, 17 herbarium specimens and 4 mounted photographs have been examined by me.

Additional citations: CHINA: Kwangsi: Tsoong 4589 (Ca--225792). HONGKONG: Ford s.n. [Hongkong] (N); C. Wright s.n. [Hong Kong] (W--44908). CHINESE COASTAL ISLANDS: Hainan: F. C. How 73616 (Bi, S); Liang 62267 (S), 62467 (La, N); Wang 33985 (N). INDONESIA: GREATER SUNDA ISLANDS: Sumatra: Boeea 8017 (S). CULTIVATED: England: Shepherd s.n. [Hort. Liverpool] (N). Hongkong: Herb. Hongkong Bot. Gard. s.n. (E--photo, N--photo, N--photo, S, S, Z--photo).

CALLICARPA BREVIPES f. ANNAMENSIS Moldenke, Phytologia 4: 41. 1952.

Bibliography: Moldenke, Phytologia 4: 41 & 76. 1952; Moldenke, Biol. Abstr. 26: 1471. 1952; Moldenke, Résumé 175 & 443. 1959.

This form differs from the typical form of the species and from the several other described forms in having its leaf-blades decidedly elliptic, the larger ones about 15 cm. long and 6 cm. wide, minutely serrulate from below the middle to below the terminal acumination, attenuate-acute at the base.

The type of this form was collected by Joseph and Mary Knapp Clemens (no. 4499) at Tourane or its vicinity, Annam, Indochina, between May and July, 1927, and is deposited in the Britton Herbarium at the New York Botanical Garden. The collectors describe it as a shrub with lavender-pink flowers. Material has been misidentified and distributed in herbaria as C. brevipes (Benth.) Hance.

In all, 4 herbarium specimens, including the type, have been examined by me.

Citations: INDOCHINA: Annam: Clemens & Clemens 4499 (Ca--340416--isotype, N--type, Ut--138a--isotype), 5055 (Ca--340416).

CALLICARPA BREVIPES f. SERRULATA P'ei, Mem. Sci. Soc. China 1 (3): [Verbenac. China] 47. 1932.

Synonymy: Callicarpa brevipes f. subglabra P'ei ex Moldenke, Résumé Suppl. 3: 30, in syn. 1962.

Bibliography: P'ei, Mem. Sci. Soc. China 1 (3): [Verbenac. China] 47. 1932; Moldenke, Known Geogr. Distrib. Verbenac., ed. 1, 56, 58, & 86. 1942; Moldenke, Alph. List Cit. 1: 284 (1946) and 3: 718. 1949; Moldenke, Known Geogr. Distrib. Verbenac., ed. 2, 130, 135, & 177. 1949; Moldenke, Résumé 167, 174, & 443. 1959; Moldenke, Résumé Suppl. 3: 19 & 30. 1962.

This form differs from the typical form of the species in having its leaf-blades ovate-lanceolate, dentate, acuminate at the apex, subcordate at the base, and the fruits 5 mm. in diameter.

P'ei (1932) also says "This form differs from the type by its

leaves which are widened at the middle and distinctly toothed and rounded to subcordate at the base". It was based by him on four collections: (1) Ching 2198, collected at Taisuan, Chekiang, China, in July 1924, (2) Ching 2105, collected at 500—900 meters altitude between Pingyung and Taisuan, Chekiang, in July 1924, (3) Chun 6803, collected at Hongkong in November 1928, and (4) F. A. McClure 2664 [Herb. Canton Chr. Coll. 9222], collected at T'ahon, Hainan Island, in April 1922.

Collectors describe the plant as a slender, small, woody shrub, 0.8—1.5 meters tall, sometimes scandent, with a few branches, the flowers white or white and yellow, and the young fruit green or pale-green. It has been found growing in forests, forested ravines, or thickets, in the shade of dense woods, along roadsides, in light woods, along the borders of streams, or climbing on rocks, at altitudes of 1000 to 1800 feet, flowering in April, May, and July, fruiting in January and August. The flowers are described as "white" on How 72007, F. A. McClure 2664, and Tsui 199, and as "white and yellow" on Peng, Tak, & Kin 296.

The type of C. brevipes f. subglabra was collected by To Kang Peng, Ts'ang Wai Tak, and Ts'ang Un Kin (no. 296) in Kwangtung, China, and is deposited in the herbarium of the University of California at Berkeley.

Callicarpa brevipes f. serrulata differs from C. longissima (Hemsl.) Merr. (which has entire or subentire leaf-blades) by its serrate or serrulate leaves. Material has been misidentified and distributed in herbaria under the names C. brenipes Hance, C. brevipes (Benth.) Hance, and C. longissima (Hemsl.) Merr.

In all, 11 herbarium specimens, including type or cotype material of both names involved, and 2 mounted photographs have been examined by me.

Citations: CHINA: Chekiang: R. C. Ching 2105 (W—1246179—cotype). Kwangtung: Peng, Tak, & Kin 296 [Herb. Canton Chr. Coll. 12295] (Ca—12295); Tsui 199 (N). CHINESE COASTAL ISLANDS: Hainan: Chun & Tso 43402 (N); How 72007 (Bz—17295), 72406 (Bz—17296); Liang 64235 (N); F. A. McClure 2664 [Herb. Canton Chr. Coll. 9222] (Ca—366337—cotype, N—photo of cotype, Ph—cotype, Z—photo of cotype); Wang 36848 (N). HONGKONG: W. Y. Chun 6803 (Ca—374155).

CALLICARPA BREVIPETIOLATA Merr., Philip. Journ. Sci. Bot. 14: 249. 1919.

Synonymy: Callicarpa eriophylla Ridl., Journ. Malay. Br. Roy. Asiat. Soc. 1: 84. 1923.

Bibliography: E. D. Merr., Philip. Journ. Sci. Bot. 14: 249. 1919; H. N. Ridl., Journ. Malay. Br. Roy. Asiat. Soc. 1: 84. 1923: A. W. Hill, Ind. Kew. Suppl. 6: 34 (1926) and 7: 36. 1929; Fedde & Schuster in Just, Bot. Jahresber. 59 (2): 416. 1939; Moldenke, Known Geogr. Distrib. Verbenac., ed. 1, 63, 64, & 86.

1942; Moldenke, Alph. List Cit. 1: 254. 1946; Moldenke, Known Geogr. Distrib. Verbenac., ed. 2, 143, 144, & 177. 1949; Moldenke, Phytologia 4: 121—123. 1952; Moldenke, Résumé 158, 160, 187, 189, & 443. 1959; Moldenke, Résumé Suppl. 3: 23 (1962) and 4: 7. 1962.

Bush, open bush, or shrub, 4—12 feet tall, or small tree; branchlets terete, 1.5—2 mm. in diameter, very densely and uniformly stellate-tomentose with pale-brownish eglandular tomentum; leaves opposite; petioles 1—2.5 mm. long, densely stellate-tomentose or woolly; leaf-blades chartaceous, brittle when dry, lanceolate or oblong-lanceolate, 7—18 cm. long, 1.5—7 cm. wide, narrowed to the slenderly acuminate apex, denticulate or rather finely dentate along the margins, abruptly and broadly rounded or cordate at the base, brownish-olivaceous and more or less pubescent with short simple hairs or thinly closely hairy above, very densely and uniformly stellate-tomentose with white woolly or pale-brownish eglandular tomentum beneath; secondaries 8—12 on each side of the midrib, thick, not prominent; cymes axillary, solitary, about 1.5 cm. wide, stellate-tomentose; peduncles 5—10 mm. long; pedicels 4 mm. long during anthesis; calyx cupuliform, tomentose; corolla lavender, deep mauve-violet, old-rose, or rose-purple, infundibular, about 1.25 mm. long, the tube narrowed at the base, dilated upwards, the lobes short; stamens exserted; anthers oblong; style exserted; fruiting-cymes dense, subglobose, 1—2 cm. in diameter; fruiting-pedicels about 6.25 mm. long; fruiting-calyx shallow, about 2 mm. wide, stellate-pubescent, the rim 4-toothed; fruits very numerous, crowded, globose, pink or lovely mauve-purple, 2—2.5 mm. in diameter, black and rugose when dry.

The type of this species was collected by Harley Harris Bartlett and Carl Downey La Rue (no. 323) at Kampong Bintang Mariah, Karoland, on the east coast of Sumatra, Indonesia, on August 10, 1918, and was deposited in the herbarium of the Philippine Bureau of Science at Manila, but is now destroyed. The type of C. eriophylla was collected by Willem Hendrik de Vriese somewhere in Java and is deposited in the herbarium of the Royal Botanic Gardens at Kew.

Ridley (1923) comments "Abundant in the open country among lalang. A very pretty shrub with its white leaves and bright coloured flowers and fruit". Merrill (1919) records the common name "laoe gappa gappa" and comments that "The alliance of this species is manifestly with Callicarpa rubella Lindl., from which it is especially distinguished by its very dense stellate-tomentose indumentum, which completely covers the lower surface of the leaves." Both Lam and Bakhuizen van den Brink reduce C. brevipetiolata to synonymy under what they call C. cuspidata Roxb. and which I regard as a synonym of C. pedunculata R. Br.

The species has been found growing in thickets, pine forests, and second growth, as well as on open hillsides, at altitudes of 3000 to 7000 feet, flowering in April, June, and August, and fruiting in April, July to September, and December. The leaves on

Groenhart 163 are the largest I have seen in this taxon, being to 18 cm. long and 7 cm. wide. The flowers are said to have been "lavender" on Chand 5799, "old-rose" on Chand 1611, and "rose-purple" on Koelz 23422. Yates 1563 is described as a topotype.

Material of C. brevipetiolata has been misidentified and distributed in herbaria under the names C. cana L., C. cuspidata Roxb., C. lanata Vahl, "C. pedunculata var.", C. rubella Lindl., and [by Koorders] "Callicarpa sp. nov." Bartlett 7747 in the United States National Herbarium bears a label with the name Luffa cylindrica M. Roem., but this is probably a case of transposed labels. The vernacular name, "mata poena", on this label may, therefore, not actually apply to our plant. This name, however, is also recorded for C. brevipes (Benth.) Hance.

On the other hand, the Bosea 8017, distributed as C. eriophylla, is actually C. brevipes (Benth.) Hance.

In all, 57 herbarium specimens, including type material, have been examined by me.

Citations: PAKISTAN: East Bengal: Griffith 6036 (T). INDIA: Assam: Chand 1611 (Mi), 3202 (Mi), 5799 (Mi), 6225 (Mi); Koelz 23422 (Mi), 26055 (Mi), 32138 (Mi). Khasi States: Hooker & Thomson s.n. [Mont. Khasia] (M). West Bengal: C. B. Clarke 11852 (Bz--17560). INDONESIA: GREATER SUNDA ISLANDS: Java: Backer 11383 (Bz--17676, Bz--17677, Bz--17678, Bz--17679); Brinkman 540 (Bz--17489); Burck 407 (Bz--17674, Bz--17675); Docters van Leeuwen-Reijnvaan 1070 (Bz--17490); Groenhart 163 (Ut--22818a); Koorders 29459b [339*] (Bz--17680), 36198b [1758*] (Bz--17491), 38202b [255*] (Bz--17493), 38262b [1999*] (Bz--17492); Kuntze 5896 (N); Oosten 33 (Bz--17672); Steenis 2611 (Bz--17488); Stoutjesdijk 148 (Bz--17673). Sumatra: H. H. Bartlett 7747 (W--1682251); Bartlett & La Rue 323 (W--1053927--isotype); Beumée 805 (Bz--17545); D. Fairchild 1015 (Ca--301321); Galoengi 131 (Bz--17547); Hamel 424 (Kr); Huitama 92 (Bz--17543); Juchens 3203 (Bz--17549); Keers 78 (Bz--17541); Kerling s.n. (Bz--72893); Lörzing 4934 (Bz--17552), 5956 (Bz--17553), 6511 (Bz--17551), 8588 (Bz--17555), 9029 (Bz--17556), 9813 (Bz--17550); Meer Mohr 147 (Bz--17548); Ouwehand 56 (Bz--17557); Steenis 5826 (Bz--17542); Toroes 1220 (N); R. Wind 9 [Boschproefstation BB.9826] (Bz--17546); H. S. Yates 101 (W--1261151), 1563 (Bz--17544, Ca--259330, Mi, N), 2313 (Bz--17554, Ca--308375, Mi).

CALLICARPA BUCHERI Moldenke in Fedde, Repert. Spec. Nov. 40: 67–68. 1936.

Synonymy: Callicarpa bucherii Moldenke, Résumé Suppl. 14: 6, in syn. 1966.

Bibliography: Moldenke in Fedde, Repert. Spec. Nov. 39: 300

(1936) and 40: 67—68, 119, 122, 125, & 127. 1936; Moldenke, Geogr. Distrib. Avicenn. 4. 1939; Moldenke, Known Geogr. Distrib. Verbenac., ed. 1, 24 & 86. 1942; Moldenke, Alph. List Cit. 1: 75. 1946; H. N. & A. L. Moldenke, Pl. Life 2: 52. 1948; Moldenke, Alph. List Cit. 2: 487 (1948) and 3: 757 & 867. 1949; Moldenke, Known Geogr. Distrib. Verbenac., ed. 2, 42 & 177. 1949; E. J. Salisb., Ind. Kew. Suppl. 10: 38. 1947; Alain in León & Alain, Fl. Cuba 4: 304 & 305. 1957; Moldenke, Résumé 50 & 443. 1959; Moldenke, Résumé Suppl. 14: 6. 1966.

In all, 11 herbarium specimens, including the type of all the names involved, and 4 mounted photographs have been examined by me.

Additional citations: CUBA: Oriente: J. B. Acuña Galé 17877 (Es); Acuña Galé & Diaz Barreto 17440 (Es, N); Alain & López 4212 (Z); G. C. Bucher 94 [Herb. Roig 4965] (Ha--isotype); Clemente 6602 (N), 7269 (N).

CALLICARPA CANDICANS (Burm. f.) Hochr., Candollea 5: 190. 1934.

Additional & emended synonymy: Mamanira Rumph., Herb. Amboin. 4: 123, pl. 58. 1743. Urtica candicans Burm. f., Fl. Ind. 197 [sphalm. "297"]. 1768. Callicarpa cana L., Mant. Pl. Alt. 198. 1771 [not C. cana Dalz. & Gibs., 1919, nor Gamble, 1881, nor Wall., 1863]. Callicarpa tomentosa Lam., Encycl. Méth. 1: 562—563. 1783 [not C. tomentosa Bakh., 1932, nor Hook. & Arn., 1918, nor König, 1893, nor L., 1959, nor (L.) Murr., 1774, nor Murr., 1774, nor Thunb., 1959, nor Vahl, 1794, nor Willd., 1808]. Callicarpa americana Lour. apud Vahl, Symb. Bot. 3: 12. 1794 [not C. americana Blanco, 1884, nor Hort., 1936, nor L., 1753, nor Lam., 1966, nor Roxb., 1945, nor Sessé & Moc., 1893, nor Willd., 1936]. Callicarpa cana: foliis serratis subtus tomentosis L. apud Vahl, Symb. Bot. 3: 12, in syn. 1794. Callicarpa tomentosa, foliis ovato-lanceolatis acutis serratis, subtus tomentosis albis, baccis parvis nigris distinctis Lam. apud Vahl, Symb. Bot. 3: 12, in syn. 1794. Callicarpa macrocarpa Raeusch., Nom. Bot., ed. 3, 37. 1797. Callicarpa foliis ovatis denticulatis per petiolum semidecurrentibus, subtus villoso-canis, paniculis dichotomis Vahl apud Willd., Linn. Sp. Pl. 1: 620, in syn. 1797. Callicarpa (cana) foliis serratis subtus tomentosis L. apud Willd., Linn. Sp. Pl. 1: 620, in syn. 1797. Callicarpa (tomentosa) foliis ovato-lanceolatis serratis subtus tomentoso-albis, baccis parvis nigris distinctis Lam. apud Willd., Linn. Sp. Pl. 1: 620, in syn. 1797. Callicarpa adenanthera R. Br., Prodr. Fl. Nov. Holl. 1: 513. 1810. Callicarpa heynii Roth ex Roem. & Schult., Linn. Syst. Veg. 3: 96. 1818. Callicarpa cana; foliis ovatis denticulatis per petiolum semidecurrentibus, subtus villoso-canis, paniculis dichotomis Vahl apud Roem. & Schult., Linn. Syst. Veg. 3: 94, in syn. 1818. Callicarpa cana; foliis serratis subtus tomentosis L. apud Sims in

Curtis, Bot. Mag. 47: pl. 2107, in syn. 1819. Callicarpa sinensis Nois. es Steud., Nom. Bot., ed. 1, 1: 137. 1821. Callicarpa tomentosa L. ex Spreng. in L., Syst. Veg., ed. 16, 1: 419, in syn. 1825. Callicarpa dentata Roxb. ex Wall., Numer. List 87, no. 1834. 1831 [not C. dentata Roth, 1818, nor Sessé & Moc., 1940, nor Wall., 1893]. Callicarpa rheedii Kostel., Allgem. Med.-pharm. Fl. 3: 829. 1834. Callicarpa sinensis Hort. ex Steud., Nom. Bot., ed. 2, 257. 1840. Callicarpa latifolia Zipp. ex Span., Linnaea 15: 330, in syn. 1841. Callicarpus cana L. apud Hassk., Cat. Pl. Hort. Bot. Bogor. Alt. 136. 1844. Callicarpa cana Vahl ex Pritz., Icon. Bot. Ind. 2: 55. 1866. Callicarpa bicolor Schau. apud Vidal y Soler, Rev. Pl. Vasc. Filip. 208, in syn. 1886 [not C. bicolor A. L. Juss., 1806, nor F. Vill., 1880]. Callicarpa cana var. dentata (Roxb.) H. J. Lam, Verbenac. Malay. Arch. 71. 1919. Callicarpa cana var. integrifolia H. J. Lam, Verbenac. Malay. Arch. 74. 1919. Callicarpa cana var. integrifolia f. typica H. J. Lam, Verbenac. Malay. Arch. 74. 1919. Callicarpa cana var. latifolia H. J. Lam, Verbenac. Malay. Arch. 71. 1919. Callicarpa cana var. latifolia f. pentandra H. J. Lam, Verbenac. Malay. Arch. 73. 1919. Callicarpa cana var. latifolia f. typica H. J. Lam, Verbenac. Malay. Arch. 71. 1919. Callicarpa cana var. longifolia H. J. Lam, Verbenac. Malay. Arch. 72. 1919. Callicarpa cana var. typica H. J. Lam, Verbenac. Malay. Arch. 70. 1919. Callicarpa runcinata Zipp. ex H. J. Lam, Verbenac. Malay. Arch. 73, in syn. 1919. Callicarpa candicans var. typica (Bakh.) Hochr., Candollea 5: 190. 1934. Callicarpa canescens (Burm. f.) Hochr. ex Moldenke, Alph. List Cit. 2: 358 & 359, sphalm. 1948. Callicarpa candidans (Burm. f.) Hochr. ex Van Steenis, Act. Hort. Berg. 15 (2): 42, sphalm. 1949. Callicarpa haynii Roth ex Moldenke, Résumé 243, in syn. 1959. Callicarpa cana Spreng. ex Moldenke, Résumé Suppl. 14: 6, in syn. 1966.

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1821; Steud., Nom. Bot., ed. 1, 1: 137. 1821; Link, Enum. Pl. Berol. Alt. 1: 124. 1821; Spreng. in L., Syst. Veg., ed. 16, 1: 419 & 420. 1825; Blume, Bijdr. Fl. Nederl. Ind. 817. 1826; J. A. & J. H. Schult., Mant. 3: 52, 53, & 55. 1827; Spreng. in L., Syst. Veg., ed. 16, 5: 126. 1828; Wall., Numer. List 50 (1829) & 87, no. 1834. 1831; Roxb., Fl. Ind., ed. 2 [Carey], 1: 392. 1832; Kostel., Allgem. Mediz.-pharm. Fl. 3: 828—829. 1834; Decne., Nouv. Ann. Mus. Hist. Nat. Paris 3: 401. 1835; Hook., Comp. Bot. Mag. 1: 349. 1836; Hook. & Arn., Bot. Beech. Voy. 205. 1836; Grah., Cat. Pl. Bombay 156. 1839; D. Dietr., Syn. Pl. 1: 428 & 429. 1839; Dillwyn, Rev. Ref. Hort. Malab. 19. 1839; Peterm., Cod. Bot. Linn. Ind. Alph. 33. 1840; Steud., Nom. Bot., ed. 2, 257. 1840; Span., Linnaea 15: 330. 1841; Pers., Sp. Pl. 1: 342. 1842; Hassk., Cat. Pl. Hort. Bot. Bogor. Alt. 136. 1844; Walp., Repert. 4: 127—129. 1845; Jacques & Hérincq, Man. Gén. Pl. Arb. & Arbust. [Fl. Jard. Europ.] 3: 502. 1845—1862; Schau. in A. DC., Prodr. 11: 642—643 & 645. 1847; Royle, Fib. Pl. India 310—311. 1855; Miq., Fl. Ind. Bat. 2: 885—886, 888, & 889. 1856; Miq., Fl. Ind. Bat. Suppl. 1: 243 & 569. 1860; Dalz. & Gibs., Bomb. Fl. 200. 1861; Rosenthal, Syn. Pl. Diaph. 430 & 1130. 1862; Bocq., Rev. Verbenac. 129 & 137, pl. 8. 1863; Bocq., Adansonia 2: 129 & 137 (1862) and 3: 192 & 263, pl. 8, fig. 12—22. 1863; Bocq., Rev. Verbenac. 129, 137, 192, & 263, pl. 8, fig. 12—22. 1863; Decne., Nouv. Ann. Mus. Hist. Nat. Paris 3: 401. 1865; Hassk., Neu Schlüs. Rumph. Herb. Amboin. 84. 1866; Pritz., Icon. Bot. Ind. 1: 188 (1866) and 2: 55. 1866; Hassk., Hort. Mal. Rheed. Clavis 38. 1867; Benth. & Muell., Fl. Austral. 5: 56—57. 1870; Roxb., Fl. Ind., ed. 3 [C. B. Clarke], 131. 1874; Blanco, Fl. Filip. Atlas pl. 427 bis. 1878—1880; Gamble, Man. Ind. Timb. 283. 1881; F. Muell., First Census 103. 1882; F. M. Bailey, Syn. Queensl. Pl. 377. 1883; Vidal, Sin. Fam. Gen. Pl. Leñ. Filip. pl. 34, fig. C. 1883; Rolfe, Journ. Linn. Soc. Lond. Bot. 21: 315. 1884; E. Balf., Cyclop. Ind., ed. 3, 1: 550. 1885; W. B. Hemsl., Rep. Scient. Res. Voy. Challenger Bot. 1 (1): 110 & 176. 1885; C. B. Clarke in Hook. f., Fl. Brit. Ind. 4: 568. 1885; Vidal y Soler, Rev. Pl. Vasc. Filip. 208. 1886; H. O. Forbes, Wand. Naturforsch. Malay. Arch. 2: 226. 1886; Maxim., Mél. Biol. 12: 505. 1886; Watt, Dict. Econom. Prod. Ind. 2: 26. 1889; F. Muell., Sec. Census 173. 1889; F. M. Bailey, Cat. Pl. Queensl. 35. 1890; Forbes & Hemsl., Journ. Linn. Soc. Lond. Bot. [Ind. Fl. Sin. 2:] 26: 252. 1890; G. W. Johnson, Gard. Dict. 157. 1890; Warb. in Engl., Bot. Jahrb. 13: 426. 1891; Jacks. in Hook. f. & Jacks., Ind. Kew. 1: 386. 1893; Bois, Dict. Hort. 232. 1893—1899; Nairne, Flower. Pl. West. Ind. 247. 1894; Briq. in Engl. & Prantl, Nat. Pflanzenfam. 4 (3a): 166. 1895; Koord., Meded. Lands Plant-tuin Buitenz. 19: 558. 1898; K. Schum., Notizbl. Bot. Gart. Berlin 2: 144. 1898; K. Schum. & Lauterb., Fl. Deutsch. Schutzgeb. Südsee 522. 1900; G. Nichols., 1900 Suppl. Dict. Gard. 185. 1900; Koord. & Valet., Bijdr. 7: 175 & 177. 1900; F. M. Bailey, Queensl. Fl. 4: 1174. 1901; W. P. Wright in Cassell, Dict. Pract. Gard., ed. 1, 1: 156. 1902; E. D. Merr., Philip. Bur. Forest. Bull. 1: 51. 1903; C. B. Clarke in Schmidt, Bot. Tidsskr. 26: 171—172. 1904; Cooke, Fl. Presid. Bombay 423. 1905; Prain, Rec. Bot. Surv.

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581, 584, 634, 643, & 644 (1948), 3: 658, 700, 765, 810, 852, 877, 878, 932, & 957 (1949), and 4: 987, 1100, 1102, 1103, 1148, 1155, 1206, 1208, & 1226. 1949; Moldenke, Phytologia 3: 138—140. 1949; Moldenke, Known Geogr. Distrib. Verbenac., ed. 2, 124, 125, 130, 135, 138—140, 142—148, 150, 152, 156, & 177. 1949; H. N. & A. L. Moldenke, Anal. Inst. Biol. Mex. 20: 3. 1950; Moldenke, Phytologia 3: 294 & 296 (1950), 4: 83 & 121—125 (1952), and 6: 215. 1958; F. R. Fosberg, Pacific Sci. 12: 20. 1958; Moldenke, Résumé 158, 160, 168, 174, 175, 177, 179, 182, 185—187, 189, 191—196, 200, 203, 208, 213, 241—247, 319, 355, & 443. 1959; Anon., Kew Bull. Gen. Index 1929-1956, 59. 1959; Moldenke, Résumé Suppl. 3: 19, 20, & 22 (1962) and 6: 8. 1963; Moldenke, Dansk Bot. Arkiv 23: 87. 1963; Backer & Bakh., Fl. Java 2: 601. 1965; Moldenke, Résumé Suppl. 13: 6 (1966) and 14: 3, 4, 6, & 7. 1966; Moldenke, Phytologia 13: 426, 439, 475, 478, 499, & 502. 1966.

Illustrations: Rheede & Munnicks, Hort. Ind. Malab. 4: pl. 60. 1683; Rumph., Herb. Amboin. 4: pl. 58. 1743; Schrank, Pl. Rar. Hort. Acad. Monac. 1: pl. 37. 1819; Bocq., Adansonia 3: [Rev. Verbenac.] pl. 8, fig. 12—22. 1863; Vidal, Sin. Fam. Gen. Pl. Leñ. Filip. pl. 34, fig. C. 1883; Domin, Bibl. Bot. 22 (89): 1109, text fig. 179. 1928.

The Schrank (1819) illustration referred to above is said by Stapf (1929) to be in color, but the copy in the library of the New York Botanical Garden is uncolored. King & Gamble (1908) note that "Clarke in Fl. Br. Ind. does not quote Bot. Mag. 2107, which Bentham had said probably represented a much more woolly plant, though it might be a var. of cana. With this we agree."

It should be noted here that the C. americana of Blanco, referred to in the synonymy above, is a synonym of C. formosana Rolfe, that accredited to "Hort." is C. longifolia Lam., that of Linnaeus is a valid species, while that of Lamarck, of Roxburgh, and of Willdenow are C. americana L., and that of Sessé & Mociño is C. pringlei Briq. The C. bicolor of A. L. Jussieu is a valid species, while that of Fernandez Villar is C. formosana Rolfe. The C. cana of Dalzell & Gibson is C. tomentosa (L.) Murr., that of Gamble is C. macrophylla Vahl, and that of Wallich is in part C. longifolia Lam. and in part C. pedunculata R. Br. The C. dentata of Roth is C. pedunculata R. Br., that of Sessé & Mociño is Cornutia grandifolia (Schlecht. & Cham.) Schau., and that of Wallich is C. longifolia Lam. The C. tomentosa of Bakhuizen van den Brink is in part C. arborea Roxb. and in part C. integerrima Champ., that of Hooker & Arnott and that of Willdenow are C. loureiri Hook. & Arn., that of König is C. macrophylla Vahl, that accredited to Linnaeus is C. erioclona Schau., that of Murray is C. tomentosa (L.) Murr., a valid species, that of Thunberg is C. longifolia Lam., and that of Vahl is something whose identity has not yet been established.

In my 1936 work I mistakenly included C. bicolor A. L. Juss., C.

cana var. glabriuscula H. J. Lam, C. cana var. integrifolia f. glabriuscula H. J. Lam, C. cana var. sumatrana (Miq.) H. J. Lam, C. chinensis Hort., and C. sumatrana Miq. in the synonymy of this taxon, for which I then accepted the name C. cana L. I now regard C. bicolor as a valid species; C. cana var. integrifolia f. glabriuscula is C. elegans Hayek, and the others are C. candicans var. sumatrana (Miq.) Moldenke. Lam (1914, 1919) also included C. bicolor A. L. Juss. in the synonymy of C. cana, while King & Gamble (1908) and Domin (1928) included both C. bicolor and C. sumatrana.

The C. acuminata Roxb., given as a synonym of C. cana by Steudel (1840), is actually C. mudiflora Hook. & Arn.; the Anonymus baccifera, verticillata, folio molli, & incano Pluk. and its variant orthography, Anonymus baccifera, verticillata, folio molli et incano Pluk., given as synonyms by Loureiro (1790, 1793) belong in the synonymy of the true C. americana L.; the C. wallichiana Walp., given as a synonym by Dalzell & Gibson (1860), is C. tomentosa (L.) Murr.

Curiously, Crevost & Pételot (1934) seem to maintain C. americana Lour., C. cana L., and C. rheedii Kostel. all as valid species, with only C. tomentosa Lam. as a synonym of C. cana.

It is worth noting here that the original publication of C. cana L. is often cited as "L., Mant. 2: 198" or "L., Mant., ed. 2, 2: 198". Merrill (1903) and Lam (1919) date it "1767" in error. Lam also dates the original publication of C. adenanthera erroneously as "1827", that of C. dentata as "1828", that of C. rheedii as "1836", and that of C. sinensis as "1841". The original publication of C. heynii is sometimes given as "Roth, Nov. Pl. Spec. 82. 1821", apparently in error. The "Journ. Roy. Asiatic Soc. Bengal 74 (3): 1012 & 1018 (1909)" reference sometimes cited is an error for King & Gamble, Mat. Fl. Malay. Penins. 21: 1016--1017 (1909).

It is perhaps also worth mentioning here that the Kosteletsky (1834) reference given in the bibliography above is sometimes inaccurately dated in bibliographies as "1835" -- actually, it was pages 1119 onwards in this work that were published in 1835. The Hassk., Cat. Pl. Hort. Bot. Bogor. Alt. 136 (1844) reference is sometimes cited as "Hassk., Cat. Lands Pl. Tuin Buitenz. 2: 136", an alternative title. "Roxb., Fl. Ind., ed. 1 [Carey & Wall.], 1: 392 (1820)" is sometimes given as a reference to C. candicans, but apparently in error since this taxon is not mentioned on that page.

The type of C. candicans was collected in Java and its leaves are described as "ovate-lanceolate". Linnaeus' original (1771) description of C. cana should be reproduced here because of its nomenclatural importance: "CALLICARPA foliis serratis subtus tomentosis. Habitat in Java. ♄ Frutex ramis compressiusculis, albido-tomentosis. Folia opposita, petiolata, ovato-lanceolata, serrata, spithamea, supra nervis subtus tota tomentosa. Panicu-

las axillares, dichotomae, vix foliorum longitudine, tomentosae: Bracteis minutis, subulatis, ad singulam dichotomiam oppositis. Calyx cylindricus, vix quadridentatus, laevior. Corola infundibuliformis, quadrifida. Filamenta capillaria, corolla duplo longiora. Germen superum. Stylus statura filamentorum. Stigma capitatum, obtusum."

Vahl (1794) says: "In editione Syst. Veget. MURRAYI omittitur haec species, tam a Callicarpa lanata, quam a reliquis speciebus hujus generis satis distincta. A Callicarpa lanata differt ramis, foliis subtus paniculisque e villis copiosis incanis minime vero lana densa vestitis: foliis ad dimidium petioli decurrentibus non autem basi ovatis, junioribus supra tantum subrugosis non vero adultioribus, ut in illa: supra glaberrimis nec nervis incanis: nervis et venis subtus elevatis conspicuis, nec e tomento coopertis, denique denticulis marginis majoribus in omnibus foliis, nec ut in Callicarpa lanata, in aliis foliis nullis in aliis obsoletis. Facie ad Callic. americanam propior accedit, tomentum vero ramorum & foliorum in Call. am. fere pulverulentum, folia minora serrata, serraturis profundioribus, obtusiusculis, nec acute denticulata, paniculae parvae minus ramosae, ramis non divaricatis, flores majores, calyces glabriores, capsulae majores oblongae, conveniunt coeterum figura foliorum." His reference to the fruit as a capsule is amazing.

Roxburgh's account (1820) of C. cana is of great interest: "Shrubby, downy. Leaves ovate, glandular-dentate-serrate, downy underneath. Panicles axillary, sub-globular. Stigma bifid. Berries purple....This shrub was introduced into the Botanic Garden from the Moluccas in 1798, and in three years had attained to the height of from four to eight feet, considerably ramous, with the young parts downy and the ligneous ones covered with a smooth ash coloured bark. They are in blossom in March and April chiefly, though more or less the whole year. Leaves opposite, short-petioled, from broad cordate to oblong, reticulated with margins glandular-dentate-serrate; upper side soft and of a deep green colour, but very downy, and pale underneath. — Cymes axillary, dichotomous, scarcely longer than the petioles, villous. — Flowers numerous, small, pale red colour. — Bractes subulate, caducous. -- Filaments longer than the corols, and inserted into the base of its tube, ascending. -- Style declined, length of the filaments. Stigma two-cleft. -- Berry small, round, smooth, deep purple; seeds four.....It differs from C. americana, Willd. in naving a woolly toothed calyx, two-lobed stigma and in the form of the leaves."

Link (1821) comments under C. cana L.: "Non distincta est C. tomentosa W. E. 158". Actually, however, C. tomentosa Willd. is a synonym of C. loureiri Hook. & Arn., a very different plant.

Sprengel (1825) includes a "Callicarpa tomentosa L." as a synonym, but doubtless intended this for "C. tomentosa Lam." He regards C. adenanthera R. Br. and C. heynii Roth as distinct,

giving C. acuminata Roxb. as a synonym of the latter! However, I regard C. acuminata Roxb. as a synonym of C. nudiflora Hook. & Arn., a very different plant.

Kosteletsky (1834) notes "Auf Bergen in Ostindien -- Blüht dort fast stets.....vorzüglich in März und April....Die Blätter werden für ein altericendes, besonders bei Hautkrankheiten sehr wirksames Mittel gehalten und auch zur Beförderung der Harn-Absonderung gebraucht." Other records of economic uses are known. Rosenthal (1862) says "Die Blätter worden vorzugsweise bei Flechten für wirksam gehalten.....Wurzel und Rinde dienen gegen Fieber, Leberleiden, Flechten, Krätze u.s.w." Heyne (1917) says "Struik met geneeskrachtige bladern (De Clercq No. 573). Volgens Filet... appliceert men de bladern op wonden om zwelling te voorkomen; te Batavia gebruikt man ze tegen steenpuisten." Lam (1924) reports that "die zerrissenen Blätter werden zum Betäuben von Fischen angewendet."

Dillwyn (1839) says "60. Callicarpa cana of Lin. Mant. I have the authority of my friend Robert Brown for the above reference, and the figure answers to a specimen at the Linnean Society, which has been so named by Dr. Wallich. It is quoted with a query by Dennstedt for the Callicarpa macrophylla of Vahl." He is referring here to plate 60 in Rheede's Hort. Ind. Malab. (1683). The reference here to the Linnean Herbarium is of interest because Jackson (1912) states that there are no specimens in that herbarium named C. cana. Actually, I have examined the material in the Linnean Herbarium personally. Under genus 136, Callicarpa, specimen number 2 was originally identified as C. tomentosa, then later as "cana ?" by Smith (according to B. D. Jackson), but it is actually C. nudiflora Hook. & Arn. However, specimen number 3, completely unnamed, with the single notation "Ind. or." is the true C. cana L. Perhaps it is to this specimen that Dillwyn refers as having been identified as C. cana by Wallich; if so, Wallich made no notation of his identification on the sheet. Perhaps the rule (also enforced when I examined the material) that no annotations be placed on any of the sheets was in force already then.

Bentham & Mueller (1870) say "The species extends over the Indian Archipelago to the Malayan peninsula and the Philippine Islands. The Timor and Javanese specimens, correctly referred here by the author Schauer, differ slightly from the Australian ones in their larger more acuminate leaves. The figure in Bot. Mag. t. 2107, represents a much more woolly plant but is perhaps a variety only. C. bicolor Juss., Schau., in DC. Prodr. xi. 642, and C. erioclona Schau. l. c. 643 appear to me both to be precisely the common Archipelago form of C. cana. The C. adenanthera referred by Schauer with doubt to C. longifolia Lam. appears to me to be the true C. cana."

Gamble (1881) says "Common in forests and along roadsides in the Terai and Dúars, extending probably southwards to the Ganges. It has pretty pink flowers." It is, however, probable that he is

here referring to C. macrophylla Vahl, rather than to C. candicans. This applies also to his description of the bark and wood.

Balfour (1885) curiously regards C. cana L., C. tomentosa L., and C. americana Lour. as synonyms of what he calls C. lanata L. [now known as C. tomentosa (L.) Murr.]. King & Gamble (1908) give a detailed description of what they call C. cana, but which may contain elements that apply instead to C. macrophylla, with which these authors apparently at least sometimes confused C. candicans. "A shrub, branchlets, leaves beneath, and inflorescence covered with a down of whitish, or grey or cinnamomeous stellate hairs; branchlets obtusely quadrangular. Leaves membranous; ovate, ovate-elliptic or ovate-lanceolate, shortly acuminate at apex, cuneately attenuate at base; upper surface stellate-tomentose when young, afterwards glabrous, shining and dark-coloured, glandular-punctate; lower more or less whitish-grey stellate-tomentose, sometimes rugose, but more usually softly and conspicuously hairy, glandular-punctate beneath the tomentums; margins glandular-serrate, except at the cuneate base; 4 to 7 in. long, 2 to 3 in. broad; midrib rather slender, pubescent above; main nerves 10 to 12 pairs, impressed above, slightly raised beneath, starting at an angle of 40° to 45° with the midrib and curving upwards to the margin, joined by regular transverse nearly parallel nervules; reticulations netted, impressed above; petiole .25 to .75 in. long, upper part bordered by the decurrent margins of the blade. Cymes many-flowered, rounded, scarcely longer than the petioles, dichotomous; peduncles about .25 in. long; bracts linear-subulate, very small; pedicels very short; flowers pale red. Calyx densely white-stellate-tomentose without, glabrous within, .05 in. long; teeth very minute. Corolla campanulate; tube glabrous, .075 in. long; lobes rounded, .025 in. long, slightly white-villous without. Stamens inserted close to the base of the tube; filaments much exsert, twisted, .15 in. long; anthers .02 in. long; the connective glandular-punctate, ovary somewhat depressed; style decurved, often twisted, as long as filaments; stigma funnel-shaped. Drupe globose, under .1 in. long & in diam., purple; pyrenes 4."

Merrill (1917) says "Hasskarl.....thought that [Mamanira] might possibly be Sponia amboinensis Planch. = Trema amboinensis Blume, while Teysmann.....suggested that it might be a species of Callicarpa. I consider that Teysmann is correct in his supposition, as the description is unmistakably that of a Callicarpa, while the figure is a fair representation of Callicarpa except for the very poorly drawn inflorescences. I am of the opinion that the widely distributed Callicarpa cana Linn. was the species intended, but nothing approaching this species is represented in our Amboina collections, although Rel. Robins. 2465, from Macassar, Celebes, is unquestionably referable to it. Further field work in Amboina will doubtless clear up any doubt there may exist as to the exact identity of Mamanira."

Lam (1919) says "In our opinion, C. cana is a very polymorphous species, the varieties of which show an often uninterrupted series of transitory forms between each other. Though there are certain species, the affinity of which with C. cana is evident and even close, their general habit makes them distinctly different from the present species, the varieties of which are conform in habit, the length of cymes and peduncles, and the size of the leaves." This distinguished worker divides C. cana into numerous subspecific categories and cites (1924) numerous specimens. Certain of his subspecific taxa I will discuss elsewhere, but those that I regard as belonging to typical C. candicans should perhaps have his descriptions and citations reproduced here: var. typica H. J. Lam (C. heynii Roth, C. latifolia Zipp., in part) — "folia membranacea vel subchartacea, late ovata vel ovato-rotundata usque ad subtetragona, basi in petiolum decurrentia, apice breviter acuminata vel interdum obtusa, adulta supra glabra, subtus dense albido-stellato-tomentosa, basi integra, ceterum serrata, nervis secundariis urtinque circiter 10; 7—14 cM. longo, 4 1/2—8 cM. lata, petiolo 0.6—2.8 cM. longo." — WESTERN PACIFIC ISLANDS: PHILIPPINE ISLANDS: Luzon: Cuming 1283. INDONESIA: GREATER SUNDA ISLANDS: Celebes: Teijsmann & De Vriese s.n. (Le—908.267-1061, Le—908.267-1062). Java: Elbert 20467, Forbes 1252, Junghuhn 108, Korthals 580, Mousset 1055, Waitz s.n. (Le—908.266-1230), Zollinger 157. Kambangan: De Vriese s.n. (Le—908.265-1459), Junghuhn s.n. (Le—908.265-380). LESSER SUNDA ISLANDS: Lombok: Elbert 2409. Sumbawa: Elbert 3534, 3568, 3636, 3806, 3897, 3953, & 4137. MELANESIA: BISMARK ARCHIPELAGO: New Ireland: Peekel 734.

Var. longifolia H. J. Lam — "folia subchartacea, lanceolata, utrinque acuta, adulta supra glabra, subtus dense albido-stellato-tomentosa, saepe singulis glandulis parvis, in sicco atris prope nervum primarium suffulta; nervis secundariis utrinque 8; 7—15 1/2 cM. longa, 2 1/2—5 cM. lata; petiolo 1.2—2.5 cM. longo; corolla glabra." — WESTERN PACIFIC ISLANDS: PHILIPPINE ISLANDS: Luzon: Reillo 19265. PALAU ISLANDS: Koror: Ledermann 14126, Raymundus 189. INDONESIA: GREATER SUNDA ISLANDS: Celebes: Collector undetermined s.n. (Le—908.266-1231, Le—908.266-1232). "As in var. β [sumatrana], it is distinguishable from C. longifolia by the always tomentose never floccose texture of the lower side of the leaves."

Var. latifolia H. J. Lam — "folia valde membranacea, late ovata, numquam tetragona, basi attemuata, apice longiuscule acuminata, margine ut in var. α [typica], vel crenata, vel bidentata, adulta supra glabra, subtus densiuscule stellato-tomentosa, nervis secundariis utrinque 8—10, 13—19 cM. longa, 6—11 cM. lata, petiolo 2—3 cM. longo."

Var. latifolia f. typica H. J. Lam (C. latifolia Zipp., in part) — "flores tetrameri". — WESTERN PACIFIC ISLANDS: PHILIPPINE ISLANDS: Negros: E. D. Merrill 207. PALAU ISLANDS: Yap: Vol-

kens 439. INDONESIA: GREATER SUNDA ISLANDS: Sumatra: Collector undetermined s.n. (Bz--4381). LESSER SUNDA ISLANDS: Lombok: Elbert 736 & 1992. Timor: Decaisne s.n. (Le--908.265-299), Zippel s.n. (Le--908.265-937, Le--908.265-938, Le--908.265-947). MELANESIA: BISMARK ARCHIPELAGO: Hermit: Kramer 51.

Var. latifolia f. pentandra H. J. Lam -- "flores pentameri".-- LOCALITY OF COLLECTION UNDETERMINED: Collector undetermined s.n. (Le--908.265-1108, Le--908.265-1445).

Var. dentata H. J. Lam (C. runcinata Zipp.) -- "folia membranacea vel subchartacea, basi attenuata, acumine longiusculo, vel apice subtruncata, adulta supra glabra, subtus laxiuscule stellato-tomentosa, margine basi integra, ceterum grosse et irregulariter serrato-dentata, nervis secundariis utrinque 7--8, 7 1/2--15 cM. longa, 3--7 cM. lata, petiolo 0.7--2 cM. longo." -- INDONESIA: LESSER SUNDA ISLANDS: Sumbawa: Elbert 3505. Timor: Zippel s.n. (Le--908.266-13).

Var. integrifolia H. J. Lam -- "folia membranacea vel subchartacea vel chartacea, basi apiceque attenuata, ovata vel obtusa subtetragona, margine integra, apicem versus crenulata vel subundulata vel subintegra, adulta supra glabra, opaca, subtus brunneo-luteo- vel flavido-tomentosa vel glabriuscula; corolla pilis in vittis 4 in lobis positis vestita vel glabra."

Var. integrifolia f. typica H. J. Lam -- "folia subtus dense tomentosa; corolla pilosa." -- WESTERN PACIFIC ISLANDS: MARIANA ISLANDS: Saipan: Fritz s.n. (B), Volkens 14. Tinian: Schnee s.n. (B). PALAU ISLANDS: Yap: Volkens 210. MICRONESIA: CAROLINE ISLANDS: Truk: Kraemer 36. MELANESIA: BISMARK ARCHIPELAGO: Hermit: Kraemer 10.

Var. integrifolia f. glabriuscula H. J. Lam -- "folia subtus glabriuscula; corolla glabra." -- WESTERN PACIFIC ISLANDS: MARIANA ISLANDS: Saipan: Fritz s.n. (B). INDONESIA: GREATER SUNDA ISLANDS: Salajar: Weber s.n. (Le--908.267-916). MICRONESIA: CAROLINE ISLANDS: Truk: Ledermann 14019.

In discussing his C. cana var. latifolia f. pentandra, Dr. Lam says "In some cases, like this, Callicarpa may be pentamerous, and in this point, form a transaction [transition] into Geunsia. The two genera may be distinguished, however, by the distribution of the leaves, which are in Callicarpa always opposite, and in Geunsia always opposite and alternate. As there are 5-merous Callicarpae, so there are also 4-merous Geunsiae. Yet there are no doubtful cases, in regard of habit and distribution of the leaves." With this statement I agree wholeheartedly!

It is a pity that Dr. Lam did not designate types for his subspecific taxa. It seems rather definite that some, at least (if not all!), of his citations under certain of these taxa represent C. erioclona Schau., C. erioclona var. paucinervia (Merr.) Moldenke, or C. erioclona f. glabrescens Moldenke. Unfortunately, I have not as yet had the opportunity to examine the specimens he cites,

and, conversely, the specimens which I cite have apparently not been seen by him. I would be not at all surprised if his C. cana var. integrifolia and var. integrifolia f. typica should prove to be C. erioclona or C. erioclona var. paucinervia, and that his C. cana var. integrifolia f. glabriuscula should prove to be C. erioclona f. glabrescens, necessitating a change in name for the latter. Callicarpa cana var. repanda Warb. is certainly C. erioclona.

Crevost & Pételot (1934) refer to a "C. americana L." from Indochina, but certainly mean C. americana Lour., which is a synonym of C. candicans. Bakhuizen van den Brink (1921) places Mamanira Rumph. in the synonymy of what he calls C. cuspidata Roxb. [= C. pedunculata R. Br.], and places C. dentata Roxb. both in the synonymy of C. cana L. [=C. candicans] and of C. longifolia Lam.

Backer & Bakhuizen van den Brink (1965) describe C. candicans as follows: "Adult leaves on the lower surface densely white-stellate-hairy, on the upper surface (often with the exception of the large nerves) glabrous, oval-elliptic-oblong-obovate, with a contracted, decurrent base, rounded, obtuse or acutely to obtusely acuminate, serrate-dentate, 5—25 cm by 2 1/2—15 cm; petiole 3/4—3 1/2 cm. Cymes on 1/2—1 cm long peduncles, densely stellate-hairy, 2—6 cm across; calyx c. 1 1/2 mm high, densely white-stellate-hairy; teeth minute, obtuse; corolla violet, 2 1/2—3 mm high, rather deeply lobed; tube glabrous; segments rounded, often with a few thick glands; stamens c. 4 mm; drupe globose, dark violet, 4-pyrenous. Erect shrub."

Recent collectors describe the plant as a small, erect, woody shrub or subshrub, 0.5—4 m. tall, sometimes only semi-woody, or a large tree; trunk 0.6—1 cm. in diameter; bark subaromatic and slightly bitter; wood white, soft, the annual rings marked by a line of closer pores; leaves light-green above, white with light-brown veins beneath; flowers ill-smelling; pedicels light greenish-brown; calyx light greenish-brown; corolla varying from white to rosy, red, purple, or "light-violet, darker within"; stamens purple or purplish; filaments light-violet; anthers light-yellow; style light-violet; stigma very light-violet; fruit green or pale-green when immature, later deep-violet, dark-purple, purple-black, or black, edible. Koorders 27608b has two of its leaves deeply retuse at the apex and all the leaves coarsely serrate. The flowers on Ts'ang 515 are described as "red", on Yates 25 as "purple", on Agama 1050 as "rosy to purple", and on Tsiang 873 and Ying 873 as "white".

Watt (1889) makes the following comments about this plant: "A shrub of Bengal; common in forests and along road-sides in the Terai and Duars, extending probably southward to the Ganges. Royle, in his Fibrous Plants of India, says that a fibre is prepared from this plant, called Arusha in Chittagong. Captain Thomson, reporting of this fibre, says: 'It is much too weak for either sailcloth or cordage. It, however, possesses all the free and

kindly nature of flax, and even smells like flax. It is easily worked, with little or no waste, &c.'"

Recent collectors have found the plant growing in grassy wilds, brushwood, light forests, scrub jungles, thickets, ravines, dry open places, steppe-like grass formations, sandy soil, and loam, near streams, at the edge of jungles, along roadsides, on dry hills, hillsides, open slopes, limestone, dry ground, and dry level land, in open places, and on the strand, at altitudes of 7 to 200 meters, flowering from April to August and October to February, fruiting from May to July, September, October, and December to February. It is, however, fairly certain that some of these statements include var. sumatrana, C. erioclona, and C. erioclona var. paucinervia. Koorders (1912) says that in Java C. candicans grows on "Ebene und Gebirge". Prain (1905) reports that it is "often planted in native gardens; sometimes as if wild in village shrubberies [in India]; native of Malaya". According to Johnson (1890) it was introduced into western cultivation in 1799, but 1798 seems to be the more correct date.

Common and vernacular names for this plant are numerous, including "adokk", "alalui", "alayo-ti-manók", "alo-loy", "anobrang", "anuyup", "apoe-apoe", "apu-apu", "aroosha", "arusha", "caboxoud", "callicarpa blanc", "callicarpe colonneux", "cebochoud", "damar bĕsi", "deloebang", "drodol", "dub", "dub rsáchel", "dub rschächel", "dup", "dynamite-grass", "goro-goro oetan", "gorruau", "graue Schönbeere", "graue Wirbelbeere", "hai ngan", "hamlatt", "hati-hati ketan", "kajoe", "katoempang badak", "katoempang kajoe", "katumpang", "katumpang badak", "katumpang kayo", "kikatumpang badak", "kuping bĕsi", "lo hai ngan", "lo hai ngan muk", "Malabar hoary callicarpa", "mamanirang", "manieran", "mĕniran bĕsar", "mĕniran kasar", "mĕniran kĕbo", "mĕniran oetan", "mĕniran utan", "palis", "papalsis", "poeltak-poeltak", "red-fruited tampang bĕsi", "resepo", "Rheede's Wirbelbeere", "roidi", "sai fa min", "sesepo", "sĕtampo bĕsi", "songka oetan", "songka utan", "tambalási", "tambal-basi", "tampa besi", "tampa bĕsi", "tampah bĕsi", "tampal bĕsi", "tampang bĕsi", "tampang bĕsi merah", "tampong bĕsi puteh", "tapoeng-tapoeng", "tígau", "tígau-na-itím", "tiptipinagut", "toembar bĕsi", and "túbang-dalág". It is very probable, however, that some of these names apply to what we now call var. sumatrana, C. erioclona, or C. erioclona var. paucinervia, which see. The name "tampang bĕsi" is applied also to Vitex vestita Wall. The fiber of C. candicans, as has been noted above, is known as "aroosha fiber" in India.

It is of great interest to note how various authors have given the distribution of C. candicans (or C. cana, as most of them called the taxon). Merrill (1903) says "Southern Asia, Malayan region, to Australia"; King & Gamble (1908) "Malay Archipelago, Philippine Islands, Australia"; Craib (1911) "Hainan, Malaya, Philippines, Indies"; Lam (1914) "Calcutta, Malakka, P. Pinang, Sumatra, Banka, Java, Timor, Saleyer-Ins., Minahassah, Luzon, Negros, Hermit-Ins., Palau-Ins., Neu-Mecklenberg, Yap und Truk

Ins., Karolinen, Saipan und Tinian (Marianen), N. Australien" [this obviously includes C. erioclona and C. erioclona var. paucinervia!]; Lam (1919) "Calcutta, Malacca!, Malaya (Sumatra!, Banka!, Java!, Timor!, Saleyer-Isl.!, Minahassa!), Philippines (Luzon! Negros!), Bismarck-arch. (New-Ireland, Hermit-isl.!), Palau-isl.!, Marianne-isl.!, Caroline-isl.!, Bourbon (Hallier)" [again, obviously including C. erioclona and C. erioclona var. paucinervia]; Bakhuizen van den Brink (1921) "Malabar, Silhet, Chittagong, Calcutta, Malacca, Cochin-china, China, Philippines, Malay Archipelago, New Guinea, Polynesia, Australia, & Bourbon (? cult.)"; Ridley (1923) "open country, edges of woods and clearings", Pahang, Malacca, Negri Sembilan, Perak, Wellesley, Penang, & Perlis, "Malay islands to Australia"; Lam (1924) "Calcutta, Malakka, Malayischer Archipel, Philippinen, Bismarck-Archipel, Palau Inseln, Marianen, Karolinen, Bourbon"; Domin (1928) "von Malakka über Malaya nach den Philippinen und Australien (Nord-Australien, Nord-Queensland)" [he cites two of his unnumbered collections of Febraury 1910 from Queensland and notes of them "forma vel varietas foliis minoribus, circa 4—6 cm. longis et 3—3.5 cm. latis excellens"]; L. H. & E. Z. Bailey (1930) "Malaya"; P'ei (1932) "India to Indo-China through Malaysia to tropical Australia, New Guinea, and western Polynesia"; Lam & Meeuse (1945) "Mascarenes to Polynesia". These two last-mentioned authors record the species from Miangas Island, but of this affinity I know only C. erioclona from there. It seems very probable that most, if not all, of the above "records" from Micronesia, Melanesia, and Polynesia apply to C. erioclona and/or its subspecific taxa.

It is also probably worth noting here that C. cana has been recorded from Bourbon by Bois (1893—1899), from Penang by Nicholson (1900), from Thailand by Williams (1905), from "E. India, China, Philippine Isl." by Bailey & Miller (1906), from "Hainan, Malaya, Philippines, Indies" by Craib (1912), from Kwangtung, China, by Chung (1924), from Western Australia by Gardner (1931), and from Pasan Island by Fosberg (1958). St. John (1948) records it from Angaur Island and (1946) from Tinian Island, but these are doubtless both misidentifications of C. erioclona.

Schauer (1847) cites: MASCARENE ISLANDS: Réunion: Perrottet s.n. [Bourbon]. INDIA: West Bengal: Wallich s.n. [Calcutta, anno 1819] (Dc). MALAYA: Malacca: Delessert s.n., Griffith s.n. Penang: Wallich 1834. INDONESIA: GREATER SUNDA ISLANDS: Java: Zollinger 35 & 157. He notes that he examined cultivated material and dried specimens "in h. DC. etc."

Miquel (1856) cites a Perrottet collection from Java and one of Horsfield from "G. Prace". He comments that "Deze en andere soorten worden, wegens hare bittere aromatische hoedanigheid, als geneesmiddel gebruikt".

Bentham & Mueller (1870) cite F. Mueller s.n. [Victoria river] from Northern Territory, Australia, R. Brown s.n. from Groote Island, and Bowman s.n., Daintree s.n. [Gilbert river], and Dallachy s.n. [Edgecombe Bay and Port Dennison] from Queensland.

King & Gamble (1908) cite: MALAYA: Malacca: Griffith s.n., Maingay 1190, H. N. Ridley 1589. Negri Sembilan: H. N. Ridley 9574. Penang: Phillips s.n., Porter s.n., Wallich 1834. Singapore: Kurz 2908.

Lam (1914) cites Elbert 3505 from Sumbawa. P'ei (1932) cites: CHINA: Kwangtung: Ying [Tsiang] 873. CHINESE COASTAL ISLANDS: Hainan: Chun 240 & 1554, Ford s.n., Henry s.n., Tak [Tsiang] 83 & 515. The last-mentioned is probably an error for "315". All of these collections except Ying 873 and Chun 240 are cited by me as C. candicans var. sumatrana, which see.

Dop (1932) cites the following material: INDOCHINA: Annam: Bauche s.n.; Chevalier 30580, 32300, & 32617; Clemens 4140; Eberhardt s.n.; Hayata s.n.; Lecomte & Finet 1120; Pierre s.n.; Poilane 6703 & 8148; C. B. Robinson 1273; Squires s.n. Cambodia: Béjaud 447; Couderc s.n.; Godefroy s.n. Cochinchina: Baudouin s.n.; Evrard 422; Godefroy s.n.; Lefevre 8; Pierre 5225; Talmy 282; Thorel 719. Laos: H. d'Orleans s.n.; Lecomte & Finet 1210, 1219, 1225, 1235, 1641, & 1787; Spire 1061. Tonkin: Balansa 931 & 932; Bois 255; Bon 478, 2192, & 2628; Brousmiche 333; Chevalier 32180; Colani 3899; Demange 1173; Duport 47; Eberhardt 3163, 3237, 3327, 3915, 4576, & 4811; Lecomte & Finet 15; Mouret 248. THAILAND: Kerr 1226.

Material has been misidentified and distributed in herbaria under the names C. bicolor A. L. Juss., C. dentata Roth, C. lanata Vahl, and C. reevesii Wall. On the other hand, the Ramos & Edaño s.n. [Herb. Philip. Bur. Sci. 48132 & 49172], distributed as C. candicans, are actually C. bicolor A. L. Juss.; Groenhart 163 is C. brevipetiolata Merr.; Bois 255, Burkill 12418, W. Y. Chun 1554 [Herb. Univ. Nanking 6751], Clemens & Clemens 4140, Eberhardt 3327, C. Ford s.n., M. R. Henderson 18202, Henry s.n., Lau 139, 1026, 2801, & 3379, Lei 155 & 731, Lete 193, Liang 61557, 61931, 64567, 65228, & 66541, Pierre 5225, C. B. Robinson 1273, Squires 188 & 791, Tak 83 [Herb. Lingnan Univ. 15582] & 315 [Herb. Lingnan Univ. 17064], Thorel 719, Tsang 83 & 315, Tsiang 10342, Wang 33351, and Ward 8911 are all C. candicans var. sumatrana (Miq.) Moldenke; Koorders 19498b [448] is C. caudata Maxim.; Béjaud 447, R. E. Burton 129, Commerson s.n. [Port Praslin], Edaño s.n. [Herb. Philip. Bur. Sci. 41685 & 46162], Espinosa s.n. [Herb. Philip. Forest. Bur. 30146], R. B. Fox 106, Guerrero 7 [Herb. Philip. Forest. Bur. 30367], Herre 17, Hosokawa 5838, Kanehira 79, Kariyone 31, Lam 3372, Philip. Nat. Herb. 13401, Quezon 1 [Herb. Philip. Forest. Bur. 30258], I. Ramirez s.n. [Herb. Philip. Forest. Bur. 29915], Ramos & Pascasio s.n. [Herb. Philip. Bur. Sci. 34697], C. B. Robinson 2465, Q. Ruiz s.n. [Herb. Philip.

Forest. Bur. 30005], H. St. John 21502, Takamatsu 796 & 1824 (in part), Wenzel 1328 & 3389, Zollinger 35.7062, and Zwickey 14 are all C. erioclona Schau.; Abbott & Bates 45, Hosokawa 8398, and Takamatsu 323 are C. erioclona f. glabrescens Moldenke; Cowan s. n. [April 3, 1945], Hosokawa 6190, 8348, & 8857, Kanehira 1006, 1242, & 1301, Kondo VI, s.n. [June 7, 1952], & s.n. [June 25, 1952], Lessa 24, R. Moran 4525, H. M. Mayo s.n. [Oct. 24, 1947], Takamatsu 1229, 1355, & 1824 (in part), and Wong 135 & 326 are all C. erioclona var. paucinervia (Merr.) Moldenke; and F. L. Stevens 1429 is Buddleia asiatica Lour. in the Loganiaceae.

In all, 250 herbarium specimens and 5 mounted photographs have been examined by me. It should, however, be pointed out that in the 30 years that have passed since I first published on this genus in monographic form as my Master's thesis, my concepts about the delimitations of this species have changed considerably. I cannot very easily now borrow back the many specimens which I annotated in scores of herbaria during these years. It may therefore be that some of the specimens cited below as C. candicans and with early dates on my printed annotation labels may now fall better into var. sumatrana, C. erioclona, C. erioclona f. glabrescens, or C. erioclona var. paucinervia.

Additional citations: MASCARENE ISLANDS: Réunion: Barthe s.n. [1857] (P). INDIA: West Bengal: Meebold 3827 (S). State undetermined: Rottler s.n. (K); Roxburgh s.n. [Ind. orient.] (K); Shepperd s.n. (K); T. Thomson s.n. [Plan. Ganget. inf.] (S); Wallich 41a (S). CHINA: Kwangtung: Ying 873 (Ca--359003). CHINESE COASTAL ISLANDS: Hainan: A. Henry 28393 (N); How 71326 (Bz--17469); C. Wang 33351 (N). THAILAND: F. K. Ward 37458 (Bz--17464). INDOCHINA: Annam: Poilane 6703 (B). Cochinchina: Evrard 422 (Bz--72836). Laos: F. K. Ward 8911 (N). Tonkin: Eberhardt 3163 (B). WESTERN PACIFIC ISLANDS: PHILIPPINE ISLANDS: Luzon: Fenix 9909 (Kr); F. C. Gates s.n. [Aug. 10, 1913] (Ka--66777); Holman s.n. [June 17, 1910] (Du--66988), s.n. [May 10th, 1911] (Du--67089). Mindanao: F. Guerrero 30367 (B); Quezon s.n. [Herb. Philip. Forest. Bur. 30258] (S). Island undetermined: Collector undetermined s.n. (I--photo); Née 22 (Q), 23 (Q), 26 (Q), 31 (Q). INDONESIA: GREATER SUNDA ISLANDS: Bawean: Buwalda 3051 (Bz--73011); Dorplo 80 (Bz--17427). Borneo: Boschwezen 1922 (Bz--17298); Gandrup 29 (Bz--17297). British North Borneo: Agama 1050 [352] (Ph); Yates 25 [66] (Ph). Celebes: Kjellberg 14 (S), 96 (S, S), 1275 (S); Lam 3372 (N); Pesik 12 (Bz--17463). Java: Adm. Ondern. Gamampir 28 (Bz--17300); Backer 1154 (Bz--17342), 2742 (Bz--17320), 4506 (Bz--17340, Bz--17341), 5618 (Bz--17316), 5815 (Bz--17343, Bz--17344), 6598 (Bz--17317), 7942 (Bz--17346, Bz--17347), 17982 (Bz--17349, Bz--17350), 18054 (Bz--17322), 18180 (Bz--17348), 18816 (Bz--17318, Bz--17319), 24269 (Bz--17351),

26519 (Bz--17359), 26591 (Bz--17406), 34137 (Bz--17356, Bz--17357), 34138 (Bz--17354, Bz--17355), 34139 (Bz--17353, Bz--17358), s.n. [Bandja] (Bz--17345); Bakhuizen 2062 (Bz--17308, Ut--24881a), 5618 (Bz--17313, Ca--236615), 5728 (Bz--17326, Ca--234995), 6517 (Bz--17312); Beumée 209 (Bz--17387), 473 (Bz--17392), 644 (Bz--17388), 729 (Bz--17389), 770 (Bz--17390), 1222 (Bz--17384), 1225 (Bz--17396, Bz--17397), 1250 (Bz--17394, Bz--17395), 1264 (Bz--17383), 1285 (Bz--17398, Bz--17399), 1355 (Bz--17382), 1845 (Bz--17391), 2783 (Bz--17407), 3436 (Bz--17333), 3625 (Bz--17393), 3667 (Bz--17339), 3779 (Bz--17302), 3822 (Bz--17301), 4736 (Bz--17361), 4764 (Bz--17360), 4806 (Bz--17303), A.302 (Bz--17307); Birkhoff II (Bz--17404); Blokhuis s.n. [Mei 1919] (Bz--17334, Bz--17335); Boer 3515 (Bz--17369); Brinkman 10 (Bz--17321); Broekhuijsen 15 (Bz--17305); Burck & Monchey s.n. [Buitenzorg] (Bz--17328, Ca--265964); Burger 5620 (Bz--17327); Büsgen 97 (B, Bz--17381); Buwalda 7212 (Bz--72897), 7555 (Bz--72895), 7562 (Bz--72896); Clason C.87 (Bz--17309), D.10 (Bz--17310); Clason-Laarman 966 (Bz-17314); Cordes 16 (Bz--17402); Den Hop 35 (Bz--17386); Docters van Leeuwen-Reijnvaan 773 (Bz--17363, Bz--17400), 11642 (Bz--17368), s.n. [14 Juni 1909] (Bz--17338); Edeling s.n. [Bidara Tjira] (Bz--17373, Bz--17374); Elbers s.n. [Mai 1901] (Bz--17380); Hallier 269 (Bz--17330, Bz--17331, Ut--53170), s.n. [16.VIII. 1896] (Bz--17329, Bz--17332); Hardenberg s.n. (Bz--17403); Herb. Hort. Bot. Bogor. s.n. [Japara] (Bz--17401), s.n. (Bz--17323); Jensen s.n. (Cp); Karta 147 (Bz--17428); Koorders 9706b (Bz--17428); Koorders 9706b (Bz--17424), 21928b [91*] (Bz--17409), 21998 [39*] (Bz--17408), 22505b [2348*] (Bz--17411, Bz--17412), 26211b [154*] (Bz--17421, Bz--17422), 27608b [588*] (Bz--17410), 28471b [738*] (Bz--17419), 28478b [648*] (Bz--17420), 29595 (Bz--17418), 29935b (Bz--17425, Bz--17426), 32377b [2628*] (Bz--17423), 33682b (Bz--17416, Bz--17417), 35734b [2168*] (Bz--17414), 35735b (Bz--17415), 42647b [365*] (Bz--17413); F. Kramer 32 (Bz--17377, Bz--17378); Lörzing 783 (Bz--17376), 983 (Bz--17375, Bz--17379); Mousset 1055 (Bz--17405); Oosten 15 (Bz--17306); Ploem s.n. [Java occid.] (Bz--17364, Bz--17365); Rant 44 (Bz--17311, N--photo, Z--photo); Scheffer s.n. (Bz--17366, Bz--17367); Thorenaar 319 (Bz--17336, Bz--17337); Thunberg s.n. (S); Ultée 9 (Bz--17324), 34 (Bz-17362); Van Steenis 5299 (Bz--17315); Vorderman s.n. [Batavia] (Bz--17370, Bz--17371, Bz--17372); Wisse 19 (Bz--17385), 794 (Bz--17325), 827 (Bz--17304). Kangean: Backer 26851 (Bz--17430), 27462 (Bz--17440, Bz--17441, Bz--17442, Bz--17443), 27744 (Bz--17444, Bz--17445), 28113 (Bz--17431); Dommers 94 (Bz--17438), 166 (Bz--17437). Madura: Backer 18943 (Bz--17446), 19512 (Bz--17449), 19800 (Bz--17447), 20499 (Bz--17448). Paliat: Backer 29521 (Bz--

17436). Saboenting: Backer 29790 (Bz--17439). Saoebi: Mahlmeister 21 (Bz--17429, Bz--17432). Sepandjang: Backer 28803 (Bz-17435). Sepapan: Backer 28438 (Bz--17433, Bz--17434). Sumatra: De Vriese s.n. (K). LESSER SUNDA ISLANDS: Soemba: Iboet 292 (Bz-17450, Ut--1698a). Sumbawa: Rensch 769 (Bz--17451). Timor: Castro 2 (Bz--17457, Bz--17458); Grijp 2 (Bz--17452, Bz--17453); Teijsmann 8922 (Bz--17456); Voogd 2255 (Bz--17454). AUSTRALIAN REGION: AUSTRALIA: Queensland: Collector undetermined s.n. [Edgewater Bay] (Bz--17466); Macgillivray 76 (Go). AUSTRALIAN ISLANDS: Hayman: C. T. White 10166 (N, N). CULTIVATED: France: Bouton s.n. [1835] (Br); Herb. Hort. Malmaison s.n. (B); Herb. Hort. Paris s. n. (Br); Herb. Kummer s.n. (Mu--1429). Germany: Herb. Kummer s.n. (Mu--1430); Herb. Schwägrichen s.n. (Mu--1428). India: Wallich 328 (Cp), s.n. (Cp, S). Java: Herb. Hort. Bot. Bogor. s.n. (Bz--17299). Réunion: Richard s.n. [Jard. Bot. de Bourbon] (P, P, P). Trinidad: Herb. Hooker s.n. (Mi--photo). LOCALITY OF COLLECTION UNDETERMINED: Collector undesignated 30 (Q); Herb. Alstroemer iv (S); Herb. Burman s.n. (Le); Herb. Lugd.-Bat. 908.265-1444 (Le), 908.265-1454 (Le); A. Richard 674 (Du--166515). MOUNTED ILLUSTRATIONS: Ferd. Bauer, Icon. Nov. Holl. 964 (V), 964a (V), s.n. (V).

CALLICARPA CANDICANS f. LACINIATA Moldenke, Phytologia 4: 125. 1952.

Bibliography: Moldenke, Phytologia 4: 124 & 125. 1953; Moldenke, Biol. Abstr. 27: 984. 1953; Moldenke, Résumé 196 & 443. 1959.

This form differs from the typical form of the species in having its leaf-blades incised-laciniate along the margins.

The type of the form was collected by Maria Ernestine Walsh-Held (no. 474) at Nipel, Timor, on April 18, 1929, and is deposited in the Herbarium Bogoriense at Buitenzorg. Thus far the taxon is known to me only from the type collection, of which 1 herbarium specimen and 2 mounted photographs have been examined.

Citations: INDONESIA: LESSER SUNDA ISLANDS: Timor: Walsh-Held 474 (Bz--17455--type, N--photo of type, Z--photo of type).

CALLICARPA CANDICANS var. PERRYANA (Dop) Moldenke, Phytologia 2: 310. 1947.

Synonymy: Callicarpa cana var. perryana Dop, Bull. Soc. Hist. Nat. Toulouse 64: 504. 1932.

Bibliography: P. Dop, Bull. Soc. Hist. Nat. Toulouse 64: 504. 1932; Moldenke, Known Geogr. Distrib. Verbenac., ed. 1, 59 & 86. 1942; Moldenke, Phytologia 2: 310 & 344. 1947; Moldenke, Known Geogr. Distrib. Verbenac., ed. 2, 135 & 177. 1949; Moldenke, Résumé 175, 242, & 443. 1959.

This variety differs from the typical form of the species in having its leaf-blades obovate or ovate-elliptic, rounded and shortly acuminate at the apex, and conspicuously and irregularly serrate along the upper portions of the margins.

The type of this variety was collected by G. E. Perry -- in whose honor it is named -- at Poulo Condor, Cochinchina, Indochina. I know nothing of the taxon except what is said of it in the literature. It is apparently known only from the original collection.

CALLICARPA CANDICANS var. SUMATRANA (Miq.) Moldenke, Phytologia 4: 125. 1952.

Synonymy: Callicarpa sumatrana Miq., Fl. Ind. Bat. 2: 886. 1856. Callicarpa chinensis Hort. ex C. K. Schneid., Illustr. Handb. Laubholzk. 2: 594, nom. nud. 1911. Callicarpa cana var. sumatrana (Miq.) H. J. Lam, Verbenac. Malay. Arch. 71. 1919.

Bibliography: Sims in Curtis, Bot. Mag. 47: pl. 2107. 1819; Miq., Fl. Ind. Bat. 2: 886. 1856; Jacks. in Hook. f. & Jacks., Ind. Kew. 1: 386. 1893; C. K. Schneid., Illustr. Handb. Laubholzk. 2: 594. 1911; H. J. Lam, Meded. Rijksherb. Leid. 37: 32. 1914; H. J. Lam, Verbenac. Malay. Arch. 71. 1919; Bakh., Bull. Jard. Bot. Buitenz., ser. 3, 3: 20. 1921; A. W. Hill, Ind. Kew. Suppl. 7: 36. 1929; P'ei, Mem. Sci. Soc. China 1 (3): [Verbenac. China] 56. 1932; Moldenke in Fedde, Repert. Spec. Nov. 40: 109. 1936; Moldenke, Phytologia 4: 121—125. 1952; Moldenke, Biol. Abstr. 27: 984. 1953; Moldenke, Résumé 160, 168, 174, 175, 187, 189, 195, 213, 242, 247, & 443. 1959; Moldenke, Résumé Suppl. 3: 19 & 20 (1962) and 6: 8. 1963; Moldenke, Dansk Bot. Arkiv 23: 87. 1963; Moldenke, Résumé Suppl. 14: 3. 1966.

Illustrations: Sims in Curtis, Bot. Mag. 47: pl. 2107 [in color]. 1819.

This variety differs from the typical form of the species in having its corolla-lobes densely white-tomentose on the outer surface, the leaf-blades oblong or lanceolate-ovate, 6.5—18.5 cm. long, 3—10 cm. wide, acuminate or attenuate at the apex, attenuate at the base, and denticulate along the margins except at the base, and the petioles 0.5—2.5 cm. long.

The leaf-blades are membranous or subchartaceous, glabrous above when mature, densely white-tomentose beneath, the secondaries 8—10 per side. Recent collectors describe the plant as a woody erect shrub, tall or straggling shrub, or even a subshrub, 0.5—4 m. tall, the trunk 1 cm. in diameter, the leaves "stinking, hot-scented, bitter", their blades dark-green, gray beneath, the flowers ill-smelling, the corolla pink or pinkish to pale-lilac, mauve, purple, or red, and the fruit green when immature, deep-violet or deep-purple to purple-black or black when mature, small, 1/4 inch in diameter, sweet.

The type of the variety was collected by Johannes Elias Teijsmann (no. 1159 H.B.) in Sumatra and is deposited in the Herbarium Bogoriense at Buitenzorg. I have examined the type and two isotypes and find the original labels inscribed "183", "324", and "41d".

Lam (1919) describes this taxon as follows: "var. sumatrana (Miq.) H. J. Lam (C. albida Blume, C. sumatrana Miq.) -- folia membranacea, vel subchartacea, lanceolato-ovata, basi attenuata, integra, apice acuminata, margine denticulata, adulta supra gla-

bra, subtus dense albido-tomentosa, nervis utrinque 8--10; 6 1/2-12 (—18 1/2) cM. longa, 3—4 1/2 (—10) cM. lata; petiolo 1—2 1/2 cM. longo; corolla pilis densis in vittis 4 in lobis positis, tecta." He cites: MALAYA: Malacca: Griffith s.n. (Le—908.265-1440). Penang: Delessert s.n. (Le—908.265-1424). INDONESIA: GREATER SUNDA ISLANDS: Banka: Collector undetermined s.n. (Ut—49888). Celebes: Elbert 2538. Java: Junghuhn s.n. (Ut—49887); Zollinger 35 & 157. Sumatra: Junghuhn s.n. (Le—908.266-808); Korthals s.n. (Bz—1159, Bz—3084, Le—908.265-1092, Le—908.265-1100, Le—908.265-1426, Le—908.265-367, Le—908.266-12680). He comments that "Perhaps there is a more glabrous form, belonging to this variety [Le—908.266-1268]; it seemed to us, however, not conspicuous enough, to base upon it a new forma. There are transition forms to var. γ and δ [longifolia & latifolia]. It is distinguished from C. longifolia, with which it is nearly conform in regard to the leaves by the always tomentose, never laxely floccose texture of the lower side of the leaves, and its hairy corolla".

Bakhuizen van den Brink (1921) describes the variety as "Corolla on the lobes densely white tomentose outside; leaves oblong or lanceolate-ovate, attenuate, at both ends, margins small-denticulate; 10—15 c.M. long, 3—10 c.M. wide; petioles 0.5—2 c.M. Sumatra: Padang (TEYSM. 1159; 3084); Lampong (TEYSM 4381). Distribution: Sumatra! Malacca! Bengal!"

It will be noted that Lam (1914, 1919) includes C. albida Blume in the synonymy of this taxon, but I place this in the synonymy of C. longifolia Lam. P'ei (1932) lists C. chinensis Hort. as a doubtful species. He apparently regards the present taxon as the typical C. candicans, since he cites for his C. cana the C. Ford s.n., A. Henry s.n., Tsang 83 & 315 [as "515"], and Chun 1554 cited by me below as var. sumatrana. Bakhuizen van den Brink (1921) regards plate 2107 in Curtis, Bot. Mag. (1819) as representing this variety, and dates it "1820". Sims (1819) originally described the plant depicted in his illustration as follows: "That the Callicarpa tomentosa of Lamarck is the same plant with Callicarpa cana of the Mantissa, Retzius affirms on the authority of a specimen received from the author himself. The specific name of tomentosa has been since applied to a different species. Our plant differs from americana in having the stems and underside of the leaves much more tomentose, and especially in having the racemes more lax, the berries in the latter being crowded together so as to look like one fruit; from whence it has been called the Bermudian mulberry.

"Native of Malabar, Cochinchina, Java, Sumatra, and the straits of Sunda. Requires to be kept in the stove. Introduced to the Kew Garden in 1790, by the Right Hon. Sir Joseph Banks, Bart. K. B.; but does not appear to have blossomed there at the time of the publication of the Hortus Kewensis, in 1810. Our drawing was taken from a plant communicated by Messrs. Barr and Brookes in

June 1818, from their very extensive collection at the Northampton Nursery, Newington Green." His calling the inflorescences of this plant "racemes" is an amazing error, since they are typical cymes.

Collectors have found this plant growing in sandy soil or loam, on dry level land, open slopes, open hillsides, and rough limestone hills, along roadsides, in forests, village commons, low sandy riverbeds, and dry ground, at altitudes of sea-level to 1700 meters, flowering from March to June and September to November, fruiting in March, June, July, and November. Lau describes it as "fairly common" in sandy soil of thickets on steep slopes and as "fairly common scattered shrubs" on Hainan Island; Lei calls it "scattered shrubs in village greens" but "fairly common" or "abundant", and Chun refers to it as "common" on the same island. Henderson reports it "common amongst boulders" in Malaya, and Sindhipongse calls it "common in deciduous forests" in Thailand. Chun describes it as an "herb", but this is surely an error in observation. Henderson says "fruit white", but there are only flowers (no fruit!) on the sheet bearing this label, so I question the accuracy of the statement -- no other white-fruited examples of this species have been reported thus far, although it would not be surprising to find such a form. White-fruited forms are well-known in numerous other species of the genus. The vernacular names "khao tawk" and "tampa besi" are recorded.

The flowers are described as "red" on Lau 1026 and Tsang [Tak] 315, "pinkish" on Chun 1554, "pink" on Lau 139, Lei 155, and Liang 61557 & 66541, "purple" on Sindhipongse 76, "mauve" on Mrs. D. J. Collins 2340 and M. R. Henderson 18202, and "pale-lilac" on Squires 188.

Material has been misidentified and distributed in herbaria under the names C. cana L., C. candicans (Burm. f.) Hochr., C. giraldiana Hesse, C. longifolia Lam., and even Urticaceae!

In all, 105 herbarium specimens, including the type of two of the names involved, and 3 mounted photographs and illustrations have been examined by me.

Citations: INDIA: West Bengal: Griffith s.n. [Bengal] (Bz--17483); Kurz s.n. [Sibpore, 5/67] (Bz--17482). CHINA: Kiangsi: Tsiang 10342 (N). CHINESE COASTAL ISLANDS: Hainan: W. Y. Chun 240 [Herb. Univ. Nanking 5646] (Ca--233793), 1554 [Herb. Univ. Nanking 6751] (Ca--242623), s.n. [Herb. Univ. Nanking 5805] (Ca--233793); C. Ford s.n. (N); A. Henry s.n. [Hainan, 28.3.93] (N); S. K. Lau 139 (B, Ca--525256, I, Mi, N, W--1629209), 1026 (N), 2801 (Bi, S), 3379 (Bi, S); Lei 155 (B, Ba, Bi, Bz--17467, Ca--612232, N), 731 (Ba, Bi, Bz--17468, Ca--612572, N); Liang 61557 (B, N, W--1669691), 61931 (N, S, W--1670749), 64567 (N), 65228 (Go, N), 66541 (N); Tsang [Tak] 83 [Herb. Lingnan Univ. 15582] (Ca--315771, N, W--1248844), 315 [Herb. Lingnan Univ. 17064] (Ca-356897, N, W--1659666); Wang 33351 (N). THAILAND: Mrs. D. J.

Collins 1252 (W--1701060), 2340 (W--1701677); K. Larsen 9168 (Z); Sindhipongse 76 [Herb. Roy. Forest Dept. 6020] (W--2064828). INDOCHINA: Annam: Clemens & Clemens 4140 (Ca--340720, Gg--156315, Mi, N, Ut--51a, W--1427862); C. B. Robinson 1273 (N, W--713355); Squires 188, in part (Ca--305962, La), 791 (Bz--17470, N, S). Cochinchina: Pierre 5225 (B, Bz--72839, Ca--38108, Ca--54657, N, S, S, W--1758015); Squires 188, in part (Bz--17484, W--1425737); Thorel 719 (B, Ca--54656, W--1758020). Laos: F. K. Ward 8911 (N).

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BOOK REVIEW

Alma L. Moldenke

"Fundamental of Phytomorphology" by A. D. J. Meeuse, xi & 231 pp., illus. Ronald Press Company, New York, New York 10010. 1966. $10.00

Herein the author champions the New Morphology promulgated by H. H. Thomas in 1931 and documented primarily by Hagerup, Fagerlind, Lam, Neumayer, Wettstein, Corner, Bower, Church, Fritsch and the author who hold that the Angiosperms have descended polyphyletically through several parallel evolutionary lines that were probably distinct by the early Mesozoic in gymnospermous-chlamydospermous-Bennettiales form. The loser, slain by sharp deductive logic, references to morphogenesis and reinterpretations of fossil material, is the Old Morphology with its monophyletic and sporophyll approach.

The single main force evoking adaptation through positive selective tendencies was the advent of entomophily and it resulted in the universal trend of angiospermy or the development of the gynoecia into closed structures. The female cycadopsid gymnosperm prototypes had developed ovules that were fertilized by siphonogamy leading to an early stage of double fertilization, bitegmic with a third layer of cupular origin, borne in groups on a supporting gynoclad, and subtended by a bract or stegophyll. The encasing of the ovules required the formation of stigmatic areas from ovular coats and/or carpel walls and eventual stylar extensions.

The male cycadopsid prototype became similarly arranged in compound androclads also subtended by bracts. These androclads and the gynoclads separately or together, with some sterile leafy organs, formed strobiloid anthocorms. There were subsequent reductions and differentiations producing flowers. The very last paragraph in the book is a plea to paleobotanists to hunt for such Protangiosperm fossils.

There is much meat here for discussion and many ideas for interesting speculation.

PHYTOLOGIA

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VERNACULAR NAMES FOR SOME SPECIES OF COLOMBIAN COMPOSITAE

A.E. Guevara and R.M. King

During the summer of 1965, while collecting material for cytological study of Compositae, it became very apparent that in some cases, the common or colloquial name was very useful in identifying the plants.

The following is a list of some of the species of Colombian Compositae with their equivalent vernacular name. The names have been obtained primarily from annotations on labels on herbarium specimens in the United States National Herbarium and the herbarium of the Instituto de Ciencias Naturales, Universidad Nacional de Colombia, but are supplemented by the authors' own inquiries in the field.

The determinations of the species have not necessarily been verified by specialists.

SCIENTIFIC NAME	VERNACULAR NAME
Acanthospermum australe (Loefl.) Kuntze A. hispidum DC.	cancer de loma. pecado mortal, espuela de caballo, ericito playero, cacharro, el trejo.
Achyrocline satureoides (Lam.) DC.	Juan Blanco.
Acroclinium roseum Hook.	Inmortales dobles.
Ageratum conyzoides L.	Chiba, Manrubio, yerba de chino, Marrubio blanco, yerba de chivo, Mastranto.
Ambrosia cumanensis H.B.K.	Altamisa, Artemisa.
Anthemis nobilis L.	Manzanilla de Castilla.
Artemisia sodiroi Hieron.	Alucema.
Aspilia tenella (H.B.K.) Blake	Papunga falsa, Guasquilla.
Aster laevis L. A. marginatus H.B.K.	Hortensis Cerrajita cimarrona, Tavera.

A. sinensis L.	Montenegro.
Baccharis cinnamonifolia H.B.K.	Chilca, chilca teñidora.
B. decussata (Klatt) Hier.	Armanga.
B. genistellioides Pers.	Chilca.
B. guascensis Cuatr.	Chilco.
B. floribunda H.B.K.	Chilca pegajosa, Chilca.
B. latifolia (R. & P.) Pers.	Chilca rusia, Chilca, Chilco.
B. lehmannii Klatt	Chilca-rusia.
B. macrantha H.B.K.	Ciro.
B. prunifolia H.B.K.	Ciro de sierritas, Chilco.
B. tridentata Vahl	Ciro ceniciento.
Bidens cynapiifolia H.B.K.	Cadillo menudo.
B. pilosa L.	Cadillo de huerta, Masiquía, Papunga, Chipaca, Cadillo de perro.
B. pilosa var. radiata Sch.-Bip.	Masiquiara, Papunga, Papunga de arbolito.
Calea glomerata Klatt	Carrasposa, Chicharrón, Concha de loma.
C. pennellii Blake	Cabezona, Carrasposa.
C. ternifolia H.B.K.	Carrasposa.
C. yuruparina Cuatr.	Kubeo.
Calendula officinalis L.	Calendula, Maravillosa.
Centaurea cyanus L.	Albarina.
Chaptalia nutans L.	Lechuguilla.
Chrysanthemum frutescens L.	Margarita.
C. leucanthemum L.	Margaritón.
C. pathenium (L.) Bernh.	Manzanilla matricaria, Manzanilla romana.
Chuquiraga jussieui G.F. Gmel.	Chiquiragua.

Clibadium asperum DC.	Chiu-Chiu, Sicuri, Catalina, Chisi-chisi, Chilca amarilla.
C. surinamense L.	Pintadilla.
C. sylvestre (Aubl.) Baill	Barbasco.
Conyza bonariensis (L.) Cronq.	Venadillo, Yerba de caballo.
C. bonariensis var. leiotheca (BL.) Cuatr.	Chilquilla, hoji-sauce.
Cosmos bipinnatus Cav.	Guatemala, Correo.
Dahlia lehmannii Hieron.	Dalia de huertas.
D. variabilis L.	Dalia amarilla.
Diplostephium baccharideum Blake	Romero de Monte.
D. cinerascens var. centrale Cuatr.	Guasguin.
D. floribundum subsp. putumayense Cuatr.	Chilca rusia.
D. revolutum Blake	Romero.
D. rosmarinifolium Benth.	Romero.
Elephantopus mollis H.B.K.	Yerba de caballo, Suelda-con-suelda.
Erechtites valerianifolia (Wolf) DC.	Bolador, Tachushiash, Venadillo.
Espeletia congestiflora Cuatr.	Frailejon.
E. glossophylla Mattfeld	Tabaco de la sierra.
E. glandulosa Cuatr.	Frailejón.
E. grandiflora H. & B.	Frailejón.
E. hartwegiana Cuatr.	Frailejón, lana de oveja.
E. hartwegiana Cuatr. var. brachyphylla Cuatr.	Frailejón.
E. incana Cuatr.	Frailejón.
E. jimenez-quesadae Cuatr.	Frailejón negro.
E. lopezii Cuatr.	Frailejón.
E. murilloi Cuatr.	Frailejón.
E. petiolata Cuatr. var. escobensis Cuatr.	Frailejón.
E. phaneractis (Blake) A.C. Smith	Frailejón.
E. pleiochasia Cuatr.	Frailejón.
E. schultesiana Cuatr.	Frailejón üsh.
Eupatorium acuminatum H.B.K.	Patinegra, trebol aromatizador.

E. amygdalinum Lam.	Santuaria.
E. angustifolium (H.B.K.) Spreng.	Chilca blanco-ceniza, Amargoso.
E. bullatum Klatt	Carrasposo.
E. humile (Benth.) Hier.	Moradita.
E. inulaefolium H.B.K.	Salvia amarga, Salvia amarga cimarrona, Jarilla, Almoraduz.
E. laevigatum Lam	Chilca lunareja, Chilco, Tabaco.
E. odoratum L.	Rosa vieja, Chilquita, Salvia.
E. paezense Hieron.	Yerba de chivo.
E. pycnocephalum Less.	Chilquilla.
E. scabrum L.f.	Chilquita carrasposa.
E. stoechadifolium L.f.	Vira-vira.
Galinsoga parviflora Cav.	guasca, chipaca.
Gazania speciosa Less.	Gazania remarcada.
Gnaphalium elegans H.B.K.	Vira-vira, Yerba gallinoza.
G. spicatum Lam.	Lechuguilla.
Gynoxys parvifolia Cuatr.	Rama blanca.
Helichrysum bracteatum Andr.	Botón de oro, Inmortales dobles, Siempreviva, Inmortales de bracteas.
Helipterum manglesii Muller ex Benth.	Siempreviva, Rodantes.
Hypochoeris radicata L.	Serraja de páramo, Serraja.
H. sonchoides H.B.K.	Chicoria cimarrona.
Ichthyothere scandens Blake	Barbasco.
I. terminales (Spreng.) Blake	Bayra, Jarilla blanca.
Jungia aceroides Cuatr.	Manito de oso.
J. ferruginea L.f.	Mano de Oso.
J. moschata Triana	Mano de León.
Liabum bonplandii Cass.	Yerba de Santa María.
L. caliense Hieron.	Santamaría de abejas.
L. igniarium (H.B.K.) Less.	Santa María.

L. megacephalum Sch. Bip.	Bejuco amarillo.
L. nigropilosum Hieron.	Santamaría.
L. vulcanicum Klatt	Patuda.
Lycoseris crocata (Bertol.) Blake	Amapola, Mapola, Mapola de monte.
L. latifolia (Don) Benth.	Mapola.
Matricaria chamomilla L.	Manzanilla.
Mikania cordifolia (L.) Willd.	Guaco.
M. guaco H. & B.	Guaco, Bejuco Guaco.
M. micrantha H.B.K.	Falso Guaco.
M. pachydictya B.L. Robinson	Guaco.
M. ruiziana Poepp.	Guaco lanoso.
Montanoa lehmanii (Hieron.) Blake	Arboloco.
M. ovalifolia (DC.) Sch. Bip.	Upacon.
M. quadrangularis Sch. Bip.	Arboloco.
Mutisia clematis L.f.	Clavellino, Clematide, Clavellina de bejuco, Bejuco clavellino.
M. glabrata Cuatr.	Clavellina.
Neurolaena lobata (L.) Britt.	Contra-gavilana, Salvia gavilana.
Oliganthes discolor (H.B.K.) Sch. Bip.	Cenizo, Susaca, Comejenero, Sauce, Guayacan.
Onoseris onoseroides (H.B.K.) Rob.	Hoja de Santamaría.
O. purpurea (L.f.) Blake	Santa María.
Pectis elongata H.B.K.	Comino silvestre.
Pluchea purpurascens (Swz.) DC.	Tabaco cimarron.
Pollalesta colombiana Aristeguieta	Cenizo.
Polymnia pyramidalis Tr.	Arboloco bogotano, Arboloco hueco.

P. riparia H.B.K.	Pauche, cumana, Jiquimilla.
Porophyllum ellipticum (L.) Cass.	Yerba de gallinazo.
P. macrocephalum DC.	Yerba de chulo, purranga, chipaca.
P. ruderale (Jacq.) Cass.	Venadillo, Ruda de gallina, Chucha, Gallenaza.
Pseudelephantopus spicatus (Juss.) Rohr.	Sueldo-con-suelda, Yerba de caballo.
Pseudogynoxys bogotensis (Spreng.) Cuatr.	Amapola del camino.
Pterocaulon alopecuroides (Lam.) DC.	Venadillo grande.
Senecio abietinus Wedd.	Panque Romero, Romero chiquito.
S. americanus (L.f.) DC.	Duarte.
S. formosus H.B.K.	Arnica, Arnica de Bogotá, Arnica de páramo.
S. guicanensis Cuatr.	Basquin.
S. lanatus DC.	Chitaca.
S. lehmanni Hier.	Romero de monte.
S. macrophyllus H.B.K.	Agua libia.
S. microchaete Wedd.	Romero de Monte.
S. niveo-aureus Cuatr.	Arnica ceniza.
S. pulchellus (H.B.K.) DC.	Romero, Chilquilla nudosa.
S. rufescens DC.	Frailejón blanco.
S. vaccinioides (H.B.K.) Sch. Bip.	Guasguin.
Siegesbeckia cordifolia H.B.K.	Trompetilla.
Sonchus oleraceus L.	Serraja, Serraja lechosa, Cerraja grande, Diente de león lechoso.
Spilanthes americana (Mutis) Hieron.	Santa María, Chisaca de cafetal, Yuyo quemado, Chisaca, Rizaca, Botón de oro, Chisaca calentano, Botonsillo.

Steiractinia aspera Cuatr.	Chilca, Clavellinito.
S. oyedaeoides Blake	Flor de Navidad.
Stevia lucida Lag.	Jarilla, Chilco, Vira-vira.
Sylibum marianum Gaertner	Cardo espinoso, Cardo sento, Cardón morado.
Tagetes apetala Posada	Ruda gallinoza, Ruda silvestre de clavito.
T. erecta L.	Terciopelo amarillo, Flor de muerto.
T. patula L.	Chinchimalí, Terciopelo, Flor de muerto, Amapola.
T. pusilla H.B.K.	Anisillo.
T. terniflora H.B.K.	Ruda dulce.
T. zipaquirensis H. & B.	Ruda de prados.
Taraxacum officinale Weber	Serraja.
Tessaria integrifolia R. & P.	Aliso, Cenizo, Sauce de playa, Sauce playero, Olivo.
Tridax procumbens L.	Botoncillo.
Trixis radialis (L.) Kuntze	Arnica de monte.
Verbesina crassiramea Blake	Camargo chico, Camargo, Tabaquillo.
V. pterophora Blake	Cerbatana.
V. turbacensis H.B.K.	Cerbatana, Manito de Dios.
Vernonia brachiata Benth.	Tabaquillo.
V. brasiliana (L.) Druce	Vara de caballo.
V. canescens H.B.K.	Maruchonga.
V. patens H.B.K.	Indio viejo, Varejón blanco.
V. scabra Pers.	Pebeters, Barejón, Barejón de Caballo.
Wedelia fruticosa Jacq.	Dos de Oros.

Wulffia baccata	Guasquilla.
Xanthium catharticum H.B.K.	Casamarucha.
Zinnia elegans Jacq.	Clavelón.

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BOOK REVIEWS

Alma L. Moldenke

"General Biology" - 7th edition - by William C. Beaver & George B. Noland, xxii & 604 pp., illus., C. B. Mosby Company, St. Louis, Missouri. $8.95. 1966.

The Beaver-Noland texts have been popular on our campuses especially in the central part of our country since 1939 when the first edition appeared. This new edition has two main advantages: it is considerably updated and it encompasses both molecular and holistic biology. The explanations and descriptions are clearcut and easily comprehended. The nature and value of the scientific method are extolled at the very beginning of the text but its implementation on subsequent pages is not apparent because of so much factual didactic approach. The illustrations are well chosen and effective. The printing format makes for interest and convenience in reading. An interesting feature appearing at the end of chapters is a series of brief statements about some of the outstanding contributors to each field.

This is a good basic text detailed enough for a full year course. The well trained teacher can add his own enrichment in the fields of molecular biology and biochemistry. The field of taxonomy is presented only as the 'fait accompli' catalogued listing of the major plant and animal groups. What does the student think when he sees a different group name?

"Workbook and Laboratory Manual in General Biology" - 7th edition - by William C. Beaver & George B. Noland, ix & 236 pp., illus., C. B. Mosby Company, St. Louis, Missouri. $3.90. 1966.

This companion soft-covered book planned for the text above can be adjusted to other texts also and it can be adjusted for quarter, semester or academic year courses. Its handy looseleaf form permits easy submitting of student work and quizzes periodically.

It is useful but uninspiring, like most of these manuals. Stimulating questions just are not asked except for those on p. 209; but a microscope diagram calls for labels. A valuable feature is the setup for an ecological study of part of the campus.

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THREE NEW SPECIES OF NEEA (NYCTAGINACEAE) FROM PANAMA

By John D. Dwyer and Sister M. Victoria Hayden
Dept. Biology, St. Louis University, St. Louis, Mo.

In 1961 the Nyctaginaceae was surveyed for the Flora of Panama (Ann. Missouri Bot. Garden 48: 51-65) by Robert E. Woodson in collaboration with H.J. Kidd. Three species of Neea were recognized as being present in Panama: N. delicatula Standley, N. laetevirens Standley, and N. amplifolia Donn. Smith. More than four fifths of the collections cited were from only three of the nine provinces of the Republic: Bocas del Toro, Canal Zone, and Panama. Only two collections from the Province of Darien were included: Allen 268 and Pittier 6547. As a result of several recent collections in Darien, made especially by James Duke, the number of species on the Isthmus may be increased from three to six.

In their key to species Woodson and Kidd utilized for the most part inflorescence and floral characters, specifically the pattern of the cymules and the length of the pedicels. These intergrade considerably and are not particularly strong diagnostic characters. In the present paper we do not propose to discuss the systematics of these three species, although recent collections are listed below. Fortunately the foliage of the three new species provide sharp distinguishing characters. In the following key the characters which Woodson and Kidd utilized in distinguishing the three species are accepted.

a. Leaves mostly alternate, always petiolate
  b. Larger leaves mostly obovate, obovate-elliptic or ovate-elliptic.
    c. Leaves 2-4 cm wide; cymules obviously dichasial, the terminal flowers sessile..... 1. N. delicatula
    cc. Leaves (3-) 5-15 cm wide; cymules obscurely dichasial theterminal flowers subsessile..... 2. N. amplifolia
  bb. Larger leaves elliptic.
    d. Leaves membranaceous or thin-papyraceous, the lateral veins obvious
      e. Leaves glabrous above; leaf blades (3-) 5-9 cm wide ..... 3. N. laetevirens
      ee. Leaves puberulent above; leaf blades up to 5 cm wide .....4. N. elegans.
    dd. Leaves thickly papyraceous or subcoriaceous, the lateral veins evanescent ..... 5. N. darienensis.
aa. Leaves opposite and amplexicaul .....6. N. amplexicaulis.

1. NEEA DELICULATA Standley, Contr. U.S. Nat. Herb. 18: 98. 1916.
PANAMA: Bayonet Island (Perlas Archipelago), Dwyer 1741 (MO).

2. NEEA AMPLIFOLIA Donn. Smith, Bot. Gaz. 61: 386. 1916.
CANAL ZONE: Barro Colorado Island: Sr. M. Victoria Hayden 29 (MO); 67 (MO); A. Robyns 65-3 (MO). DARIEN: Pinogana to Yaviza, Duke 5163 (MO).

3. NEEA LAETEVIRENS Standley, Field Mus. Publ. Bot. 4: 204. 1929.
CANAL ZONE: Barro Colorado Island, Sr. M. Victoria Hayden 151 (MO); 12 m S Colon, Tyson 2317 (MO). DARIEN: Cocalita, Dwyer 5158 (MO); trail between Paya & Palo de las Letras, Stern, Chambers, Dwyer & Ebinger 196 (MO); between Paya & Payita, Stern et al 368 (MO); 379 (MO); between Paya & Boca de Paya, Stern et al 436 (MO).

4. NEEA ELEGANS Dwyer & Hayden, sp. nov.

FRUTEX, ramulis primo teretibus ultime compressis minute rufo-pubescentibus. FOLIA alternata, petiolis 5-15 cm longis, rufo-pubescentibus; lamina anguste elliptica, 7-17 cm longa, 3.5-5.0 cm lata, apice attenuato-acuminata, acumine ad 1.2 cm longo, basi acuta, tenui-papyracea, puberula, ciliolis minutis irregulari-contortis modice crebris, costa infra prominula, venis lateralibus ca 7, primo late arcuatis tunc forte ascendentibus, areolis intervenialibus patulis. INFLORESCENTIAE terminales, cymoso-paniculatae, ad 7 cm longae, ad 5,5 cm latae, pedunculo ad 3 cm longo, ad 0.2 cm lato, rufo-pubescente, ramis paucis proximis vel distantibus, supra medium cymulos patulos paucifloros ferentibus, floribus terminalibus solitariis sessilibus, floribus lateralibus pedicellatis, pedicellis ca 2 mm longis, puberulis, bracteolis geminatis subulatis, ca 0.5 mm longis, divergentibus. FLORES (hic ♂) perianthio sessili elliptico-urceolato, ca 5.5 mm longo, ca 1.7 mm lato, minute rufo-pubescente, dentibus minutis; stamina ca 8, inaequalia, antheris ca 1.1 mm longis. FRUCTUS non visi.

PANAMA: Darien: rd fr El Real to Pinogana, Duke 5144 (MO, Holotype).

The new species is readily recognized by its salicoid leaf blades and short, relatively few-flowered inflorescence.

5. NEEA DARIENENSIS Dwyer & Hayden, sp. nov.

ARBORES ad 10 m altae, ramulis teretibus laevibus glabris. FOLIA alternata, petiolis 1-2 cm longis inconspicue alatis; lamina elliptica (aut foliis minoribus elliptico-rotundis vel obovato-rotundis, apice obtusis), 7.5-20 cm longa, 4.5-9 cm lata, apice acuminata, acumine ad 2 cm longo, 0.8 cm lato, crasso-papyracea, omnino glabra, venis lateralibus ca 10, arcuatis evanescentibus. INFLORESCENTIAE (hic in fructu) terminales pyramidato-paniculatae in vivo rubrae, carnosae, pedunculo subplano-com-

presso lignoso, ad 4.5 cm longo, ca 0.3 cm lato, ramis inferioribus ad 4.5 cm longis, superioribus ca 5 bene distantibus, reflexis, ramis ultimis terminalibus paucifloris subcruciformes dispositis, cicatricibus pedicellorum deciduorum conspicuis. FRUCTUS elliptici vel oblongi, ad 1.3 cm longi, obtusi, in sicco nigri, cicatrice calycis nullo, mesocarpio carnoso, endocarpio fibroso, seminibus solitariis, exalbuminosis, testa papyracea, contyledonibus carnosis, ca 4 mm longis, ca 0.5 mm crassis, eis crassam curvatam radiculam omnino tegentibus.

PANAMA: Darien: vic Paya, Rio Paya, Stern, Chambers, Dwyer & Ebinger 429 (MO, Holotype).

The thickly papyraceous leaf blades which perhaps are better described as being subcoriaceous, and the lignose fruiting inflorescence are strikingly different from the other Central American species of the genus except Neea amplexicaulis described as new below. N. darienensis, on the other hand, has conspicuously petiolate and alternate leaves.

6. NEEA AMPLEXICAULIS Dwyer & Hayden, sp. nov.

ARBORES, ramulis laevibus glabris. FOLIA amplexicaulia, opposita; lamina elliptica vel rectangulari-elliptica, 12-26 cm longa, 6.5-11 cm lata, apice obtusa tunc breviter acuminata, basi rotundo-truncata vix cordata, coriacea glabra in sicco nigro-brunnea, costa supra prominula, infra subprominente, venis lateral ibus 15-20 (folia maiora), 1-2.5 cm distantibus, late divergentibus tunc stricte et integre 2/3 ad marginem extendentibus tunc late bifurcatis, areolis intervenialibus patulo-reticulatis. INFLORESCENTIAE terminales, ad 10 cm longis, in vivo rubrae, pedunculo ad 6 cm longo, 1.8 cm lato, rufo-puberulo, ramulis primariis 2, ascendentibus, ramulis secundariis alternatis vel oppositis divergentibus, 0.5-2 cm longis, cymulis in parte superiore ramulorum persistentibus, floribus digitate dispositis. FLORES (hic ♂) sessiles, bracteolis conspicue late triangularibus, ca 0.6 mm longis, obtusis arachnoideo-rufo-pubescentibus liberis sed infra perianthum ternate dispositis, periantho oblongo, ca 2.3 mm longo, ca 1 mm lato, obtuso, carnoso, praesertim basi arachnoideo-pubescente; stamina ca 6, antheris ca 1 mm longis. FRUCTUS ramis inflorescentiarum crasse lignosis, 1.3-2.5 mm crassis, cicatricibus anthocarporum conspicue annularibus, anthocarpis ovato-ellipticis, ca 1 cm longis, ca 0.45 cm latis, fibroso-lignosis, arachnoideo-pubescentibus, apice pulvino annulo ornatis.

PANAMA: Darien: Río Pirre, Duke & Bristan 8288 (MO, Holotype); Santa Fe, Duke 8401 (MO); vic Campamento Buena Vista, Río Chucunaque above confluence with Río Tuquesa, Stern, Chambers, Dwyer & Ebinger 855 (MO).

The new species is readily recognized by its opposite and amplexicaul leaves.

ADDITIONAL MATERIALS TOWARD A MONOGRAPH OF THE GENUS CALLICARPA. V

Harold N. Moldenke

CALLICARPA CANDICANS var. SUMATRANA (Miq.) Moldenke

Additional citations: INDOCHINA: Tonkin: Bois 255 (Ca--54658, W--1758019). State undetermined: Eberhardt 3327 [Thua-thien] (Ca--38107). MALAYA: Perak: Burkill 12418 (Ca--346270). MALAYAN ISLANDS: Aor [Johore]: M. R. Henderson 18202 (Bz--17465, Ca--318663). WESTERN PACIFIC ISLANDS: PHILIPPINE ISLANDS: Luzon: Lete 193 (Ca--365687). INDONESIA: GREATER SUNDA ISLANDS: Java: Backer 9490 (Bz--17352); Sundalandschap. Urwaudenflora 3-6000 (Ut--49887). Kangean: Dommers 140 (Bz--17472). Sumatra: Backer 3113 [113] (Bz--17474); Collector undetermined 534 (Bz--17473); Lörzing 11140 (Bz--17476); Teijsmann 1159 H.B. (Bz--17475--isotype, Bz--17477--type, N--photo of type, Ut--53389--isotype, Z--photo of type), 3084 (Bz--17481), 3084 H.B. (Bz--17480, Ut--53388), 4381 H.B. (Bz--17478, Bz--17479, Ut--53390). CULTIVATED: Java: Herb. Hort. Bot. Bogor. XI.G.27 (Bz--25722, Bz--26518, Bz, N), s.n. (Bz--17471). MOUNTED ILLUSTRATIONS: Sims in Curtis, Bot. Mag. 47: pl. 2107. 1819 (N).

CALLICARPA CATHAYANA Chang, Acta Phytotax. Sin. 1: 305. 1951.

Bibliography: Chang, Acta Phytotax. Sin. 1: 305. 1951; G. Taylor, Ind. Kew. Suppl. 13: 21. 1966; Moldenke, Résumé Suppl. 14: 3. 1966.

Nothing is known to me of this species since the work in which it was originally described has not yet been available to me. The plant is said to inhabit the provinces of Kiangsi, Kiangsu, Kwangtung, and Kwangsi, China.

CALLICARPA CAUDATA Maxim., Bull. Acad. St. Pétersb. 31: 76. 1886.

Synonymy: Callicarpa caudata var. magna H. J. Lam, Verbenac. Malay. Arch. 60. 1919. Callicarpa caudata var. typica H. J. Lam, Verbenac. Malay. Arch. 60. 1919. Callicarpa caudatifolia Max. ex Moldenke, Résumé Suppl. 3: 30, in syn. 1962 [not C. caudatifolia Koidz., 1925, nor Merr., 1962]. Callicarpa mollis Koord. ex Moldenke, Résumé Suppl. 14: 7, in syn. 1966 [not C. mollis Matsumura, 1922, nor Req., 1839, nor Shirasawa, 1949, nor Sieb. & Zucc., 1844, nor Willd., 1840].

Bibliography: Maxim., Bull. Acad. Imp. Sci. St. Pétersb. 31: 76. 1886; Maxim., Mél. Biol. 12: 506--507. 1886; Durand & Jacks., Ind. Kew. Suppl. 1: 73. 1901; Hayek in Fedde, Repert. Spec. Nov. 2: 88. 1906; Elm., Leafl. Philip. Bot. 3: 862--863. 1910; Merr. & Merritt, Philip. Journ. Sci. Bot. 5: 380--381. 1910; E. D. Merr., Philip. Journ. Sci. Bot. 10: 71. 1915; H. J. Lam, Verbenac.

Malay. Arch. 47, 58--61, 65, & [361]. 1919; Bakh., Bull. Jard. Bot. Buitenz., ser. 3, 3: 23. 1921; E. D. Merr., Enum. Philip. Flow. Pl. 3: 383. 1923; Moldenke, Alph. List Common Vern. Names 3, 14, 17, 20, & 28. 1939; Moldenke, Prelim. Alph. List Invalid Names 10. 1940; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 1], 56, 61, & 86. 1942; Moldenke, Alph. List Invalid Names 8. 1942; Moldenke, Phytologia 2: 94. 1945; Moldenke, Alph. List Cit. 1: 224 (1946), 2: 404 & 463 (1948), 3: 765 (1949), and 4: 1259. 1949; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 130, 140, & 177. 1949; Moldenke, Phytologia 3: 464 (1951) and 4: 122--124. 1952; Moldenke, Résumé 168, 182, 194, 197, 198, 200, 242, & 443. 1959; Moldenke, Résumé Suppl. 3: 21 & 30 (1962), 12: 8 (1965), and 14: 4, 6, & 7. 1966; Moldenke, Phytologia 13: 431, 433, & 499 (1966) and 14: 121. 1966.

Slender large bush, shrub, or small tree, 2--10 m. tall, the young parts whitish-yellow floccose or tomentose; trunk 2--4 cm. in diameter; stems floccose-tomentose; leaves decussate-opposite; petioles short, 3--7 mm. long, whitish-yellow floccose-tomentose; leaf-blades membranous, narrowly lanceolate or linear-lanceolate, 8.5--16 cm. long, 1.8--4.5 cm. wide, gradually narrowed at both ends, gradually long-caudate-acuminate at the apex, minutely denticulate or sharply patulous-serrate along the margins, attenuate to the acute base, more or less densely hispid with simple hairs and viscid-punctate with many reddish-yellow glands above, more or less densely floccose-tomentose with stellate hairs and with many reddish-yellow glands and a few small scales beneath, the hairs more dense on the venation; secondaries 8 or 9 pairs, indistinct; inflorescence cymose, as long as the petioles; peduncles 0.5--1.5 cm. long, floccose-tomentose; cymes fasciculate, globose, 2--3.5 cm. long, 1.2--6 cm. wide, whitish-yellow floccose or tomentose; buds pink; calyx 0.75--1 mm. long, hispid with long simple hairs, glandular-dotted, with many glanduliferous hairs and some large scales, the rim obsoletely 4-dentate; corolla 1.5--2 mm. long, about twice as long as the calyx, pink or lavender-pink to lavender, pale-purple, purple, or violet, glabrous or with some simple hairs and some glands, its tube broadly cylindric, the lobes 1/3 the length of the tube; stamens slightly exserted or twice as long as the corolla; anthers subquadrate; style surpassing the stamens, slightly bilobed; ovary with 4 broad lines of glands; fruit small, green or pinkish-green when immature, becoming purple, bright-purple, or violet-blue to violet or dark-violet, glossy.

The type of this species was collected by Hugh Cuming (no. 1095) somewhere in the Philippine Islands and is deposited in the herbarium of the Jardin Botanique Principal at Leningrad. Maximowicz (1886) says of it: "Folia Callicarpa pilosissimae petiolo 5 mm., lamina 11: 2 cm. Pedunculus 15 mm., cyma diam. 20 mm. Pedicelli calycem aequantes v. superantes. Calyx 1 mm., corolla 2.5 mm. longa." Hayek (1906), in speaking of C. elegans Hayek, says "Foliorum forma Callicarpae caudatae Maxim. simillima, differt foliorum glabritie et serratura maiore nec non indumento ramorum diverso."

Lam (1919) divides the species into four varieties, but his var.

glabriuscula is a synonym of C. dolichophylla Merr. and his var. simplicipuberula is a synonym of C. merrillii Moldenke. He distinguishes his remaining two varieties as follows: "Var. α typica H. J. Lam, nov. var. — folia minora, 10 cM. longa, 1.8 cM. lata, petiolo 0.5 cM. longo; utrinque dense puberula, subtus stellato-tomentosa; cymi 1.2 cM. diam., pedunculo 0.5 cM. longo; calyx dense pilosus pilis simplicibus, pilis glanduliferis, squamis singulis. Distribution: Philippines (Max.).

"Var. β magna H. J. Lam, nov. var. — folia cum eis var. α conformia, sed dimensionibus differentia, 9 1/2 — 16 cM. longa, 2 1/2 — 4 1/2 cM. lata, petiolo 0.3—0.7 cM. longo; cymis usque ad 3 1/2 cM. longi, pedunculis 0.5—1.5 cM. longis." He bases this second variety on five cotype collections: Luzon: Curran, Merritt, & Zschokke 18127, Elmer 8646, and Herb. Philip. Forest. Bur. 1643 & 1644. Mindanao: Elmer 11333. He notes that what he calls C. reevesii Wall. (now known as C. mudiflora Hook. & Arn.) is related to C. caudata and to C. pilosissima. He also avers that C. pedunculata R. Br. is related to it, but never has its leaves with the acute or cuneate base seen in C. caudata.

The original publication by Maximowicz is dated "1887" by Durand & Jackson (1901) and by Lam (1919). It should also be noted here that the C. caudatifolia of Koidzumi, referred to in the synonymy above, is actually a synonym of C. japonica var. angustata Rehd., while that of Merrill is a synonym of C. formosana var. glabrescens Moldenke; the C. mollis of Matsamura is C. okinawensis Nakai, that of Shirasawa is xC. shirasawana Mak., that of Siebold & Zuccarini is a valid species, and that of "Req." and of Willdenow is C. acuminata H.B.K.

Koorders 19498b was identified by various herbarium workers as C. cana L., C. macrophylla Vahl, C. cuspidata Roxb., and then as "C. mollis Koord., n. sp." The name, C. caudatifolia Max., is based on Loher s.n., collected on Caraballo Mountain, Luzon, Philippine Islands, in March, 1915, and is deposited in the herbarium of the University of California at Berkeley.

Bakhuizen van den Brink (1921) places C. caudata in the synonymy of what he calls C. cuspidata Roxb., along with such diverse taxa as C. rubella Lindl., C. acutidens Schau., C. sessilifolia Wall. [=C. rubella], C. temuiflora Champ. [=C. rubella], C. micrantha Vidal, C. psilocalyx C. B. Clarke, C. pilosissima Maxim., C. longipes Dunn, C. lancifolia Merr. [=C. merrillii Moldenke], and Mamanira Rumph. [C. candicans (Burm. f.) Hochr.]. Callicarpa cuspidata Roxb. is regarded by me as a synonym of C. pedunculata R. Br.

Collectors have found C. caudata growing in open places, open forests, old clearings, forest second-growth, Castanopsis forests, open planted Casuarina forests, the secondary story of forest

clearings, and in rocky and mossy soil on ridges, on open stream-banks, pine and damp forested slopes, and small coral islands, and at stream margins, from 300 to 2000 m. altitude, flowering and fruiting in March, April, June, and August to January. The flowers are described as "pink" on Brass 5520 & 31788 and on Herb. Philip. Bur. Sci. 43310, "lavender-pink" on Clemens & Clemens 3264, "lavender" on Brass 31563, "purple" on Womersley 4323, "pale-purple" on Hoogland & Pullen 5328, and "violet" on Herb. Philip. Bur. Sci. 44895 and on Versteegh B.W.3056.

Vernacular names recorded for the plant are "anayop", "anigup", "arayop", "diapu", "gital", "harayhai", "kabatiti", "kumukwireh", "lumis via", "mama", "minari", "nimnam", "nimname", "sakoita", "saykohadza", and "suba". Clemens 7544 has a note "with Urt. & Astile rusts".

Material has been misidentified and distributed in herbaria under the names C. cana L., C. cuspidata Roxb., C. lancifolia Merr., C. longifolia Lam., C. macrophylla Vahl, C. merrillii Moldenke, C. pedunculata R. Br., C. pentandra var. paloensis (Elm.) Bakh., C. rubella Lindl., and C. stenophylla Merr. On the other hand, the De Vore & Hoover 41, distributed as C. caudata, is C. merrillii Moldenke.

In all, 94 herbarium specimens, including type material of most of the names involved, have been examined by me.

Citations: WESTERN PACIFIC ISLANDS: PHILIPPINE ISLANDS: Bohol: M. Ramos s.n. [Herb. Philip. Bur. Sci. 43310] (Ca--242439). Luzon: P. T. Barnes s.n. [Herb. Philip. Forest. Bur. 924] (N); Canicosa 7 [Herb. Philip. Forest. Bur. 30020] (Ca--291747); Curran, Merritt, & Zschokke s.n. [Herb. Philip. Forest. Bur. 18127] (Bz--17507), s.n. [Herb. Philip. Forest. Bur. 18163] (Bi); Elmer 5784 (Bz--17525, N), 5870 (N), 8646 (Bz--17505, N, Vt); F. C. Gates 6455 (Ka--64623); Loher s.n. [Caraballo Mountain, Mar. 1915] (Ca--229198); McClure 15899 (Ca--307573); E. D. Merrill 1727 (Bz--17506), 4613 (N), 11689 (Bz--17509); M. Ramos s.n. [Herb. Philip. Bur. Sci. 7724] (N); Ramos & Edaño s.n. [Herb. Philip. Bur. Sci. 37481] (Bz--17510), s.n. [Herb. Philip. Bur. Sci. 38035] (Bz--17511), s.n. [Herb. Philip. Bur. Sci. 40505] (Bz--17508), s.n. [Herb. Philip. Bur. Sci. 44895] (Ca--257612, N), s.n. [Herb. Philip. Bur. Sci. 48634] (Ca--322065, N); R. S. Williams 1060 (N, N), 1158 (N, N). Mindanao: M. K. Clemens s.n. [Herb. Philip. Bur. Sci. 15676] (Ca--268581, N); Elmer 11333 (Bi, Bz--17517, N, Vt); Mearns & Hutchinson s.n. [Herb. Philip. Forest. Bur. 4755] (Bz--17518, N, W--706252); Ramos & Edaño s.n. [Herb. Philip. Bur. Sci. 38850] (Bz--17512), s.n. [Herb. Philip. Bur. Sci. 49295] (B, Bz--17520, Ca--324454, N); Ramos & Pascasio s.n. [Herb. Philip. Bur. Sci. 34775] (N); R. S. Williams 2307 (N, N). Santa Cruz: S. Olsen 1062 (Cp). Ticao: W. W. Clark s.n. [Herb. Philip. Forest.

Bur. 2534] (Bz—17523, N). Island undetermined: Herb. Philip. Bur. Sci. s.n. (Gg—31994); Née 24 (Q). INDONESIA: GREATER SUNDA ISLANDS: Celebes: T. Kaudern 424 (N); W. Kaudern 313 (N); Koorders 19485b (Bz—17535, Bz—17536), 19498b [448] (Bz—17537, Bz—17538). LESSER SUNDA ISLANDS: Timor: Teijsmann 8942 (Bz—17497); Walsh 467 (Bz—17496). MOLUCCA ISLANDS: Amboina: C. B. Robinson 299 (Bz—17498, N). Halmahera: Anang 569 (Bz—72984), 638 (Bz—72899). Morotai: Anang 179a (Bz—72982), 235 (Bz—72981); Main & Aden 947 (Bz—72705). Sanana: Bloembergen 4431 (Bz—17499). Ternate: Beguin 1214 (Bz—17502). MELANESIA: NEW GUINEA: Dutch New Guinea: D. Bergman 443 (S); Docters van Leeuwen 10106 (Bz—72659); Kanehira & Hatusima 13539 (Bz—17504); Mayr 104 (Bz—72635); Versteegh B.W.3056 (Ng—20223). Northeastern New Guinea: Brass 31087 (W—2391917), 31563 (N, W—2392210), 31788 (W—2392341); M. K. Clemens 7544 (B), 7852b (B), 11028 bis (Mi); Clemens & Clemens 3264 (Br); Draper s.n. (Ng—16957); Hoogland & Pullen 5328 (Bi, Ng—16911, Ng, W—2314880); N. G. F. 3065 (Ng—20222); Womersley 4323 (Ng—6491). Papua: Brass 5520 (N); C. E. Carr 13163 (N); Giulianetti s.n. (Mb). BISMARK ARCHIPELAGO: Mussau: Køie & Olsen 1363 (Cp, Z). New Britain: Waterhouse 373 [Herb. Yale School Forest. 29498] (N).

CALLICARPA CAULIFLORA Merr., Philip. Journ. Sci. Bot. 7: 338—339. 1912.

Synonymy: Callicarpa pentandra f. hexandra subf. cauliflora (Merr.) Bakh. ex Moldenke, Résumé 246, in syn. 1959.

Bibliography: E. D. Merr., Philip. Journ. Sci. Bot. 7: 338—339. 1912; H. J. Lam, Verbenac. Malay. Arch. 50, 83, & [361]. 1919; Prain, Ind. Kew. Suppl. 5: 43. 1921; Bakh., Bull. Jard. Bot. Buitenz., ser. 3, 3: 13. 1921; E. D. Merr., Journ. Malay. Br. Roy. Asiat. Soc. 1: 32. 1923; E. D. Merr., Enum. Philip. Flow. Pl. 3: 383. 1923; Moldenke, Known Geogr. Distrib. Verbenac., ed. 1, 62 & 86 (1942) and ed. 2, 140 & 177. 1949; Moldenke, Résumé 182, 246, & 443. 1959.

Shrub or small tree; branchlets tetragonal, rather stout, brownish-floccose and glandular or rather densely covered with brownish plumose-stellate hairs and also yellow-glandular; leaves decussate-opposite; petioles stout, 1—2 cm. long, densely stellate-pubescent; leaf-blades chartaceous, oblong-elliptic, 30—35 cm. long, 9—13 cm. wide, slenderly and sharply acuminate at the apex, distantly and irregularly denticulate along the margins or entire, gradually narrowed or attenuate to the base, glabrous above, somewhat paler, yellow-glandular, and sparingly stellate-pilose on the midrib, secondaries, and veinlet reticulation beneath, denser on the midrib, the hairs often plumose; secondaries about 14 pairs, prominent beneath, anastomosing; veinlet reticulation prominent, rather lax; inflorescence borne on the trunk, fasciculate, the cymes sessile, cauliflorous, hemispheric, crowded, rather dense, 2—3 cm. wide, slightly hirsute or brownish-

floccose, glandular; pedicels 3—5 mm. long; bractlets linear-lanceolate, 1—2 mm. long; calyx oblong-ovoid, about 3 mm. long, 1.8 mm. wide, its rim equally 4-toothed, the teeth narrowly ovate, 0.5 mm. long, acute at the apex; corolla dark-red, about 7 mm. long, cylindric, slightly glandular and pubescent on the outside, the limb 4-lobed; anthers oblong, 3 mm. long, glandular on the back; fruit globose, the lower half enclosed by the fruiting-calyx, about 4 mm. wide, with 4 pyrenes.

The type of this species was collected by Harry Nichols Whitford and Wallace Irving Hutchinson [Philippine Forest Bureau 9321] in canyons in forests, at an altitude of 20 meters, at Porto Banga, in the district of Zamboanga, Mindanao, Philippine Islands, on January 13, 1908, and was deposited in the herbarium of the Philippine Bureau of Science at Manila, but is now destroyed. Merrill (1912) says "A species well characterized by its cauline, fascicled inflorescence, in this character differing from all the other species of the genus known to me. Allied to C. ramiflora Merr., but with a quite different indumentum." Lam also affirms that its affinity is with C. ramiflora. Bakhuizen van den Brink (1921) reduces it to synonymy under what he calls C. pentandra var. typica f. hexandra (Teijsm. & Binn.) Bakh., which I regard as the very different Geunsia hexandra (Teijsm. & Binn.) Koord.

In all, 3 herbarium specimens have been examined by me.

Citations: WESTERN PACIFIC ISLANDS: PHILIPPINE ISLANDS: Leyte: M. Ramos s.n. [Herb. Philip. Bur. Sci. 41540] (Bz—18224, Bz—18225, Z).

CALLICARPA CHENAULTI Fairchild, Expl. Plants 51, nom. nud. 1930.

Bibliography: D. Fairchild, Expl. Plants 50—51. 1930; Moldenke, Known Geogr. Distrib. Verbenac., ed. 1, 71 & 86. 1942; H. N. & A. L. Moldenke, Pl. Life 2: 53. 1948; Moldenke, Known Geogr. Distrib. Verbenac., ed. 2, 156 & 177. 1949; Moldenke, Résumé 213 & 443. 1959.

Nothing is known to me about this plant except what is stated by Fairchild (1930). His reference, in full, is as follows: "There were three individual horticulturists in France for whom I had conceived a very unusual regard through seeing the results of their breeding work. They were M. Leon Chenault, who had been for many years one of the foremost nurserymen of France, and whose gardens had been the first testing-out place for hundreds of new species and varieties of plants, especially from the Orient; M. Lemoine, the great breeder of lilacs, deutzias and other ornamental shrubs; and Pernet Ducher, than whom there has never been a greater breeder of roses. I was able to see M. Chenault and M. Ducher, but not, unfortunately, M. Lemoine. I spent a delightful day with Chenault and his son at Orléans, where Chenault père has, in his five-acre yard in the suburbs of the city, a most unusual lot of rare Chinese shrubs gathered together since his retirement to a new home in Orléans fourteen years ago. It seemed hardly credible that in this climate, in so short a time, one could so

transform a place and almost entirely with comparatively newly introduced things, but when one has been a nurseryman and dealt with a great variety of plants for fifty years one knows just what to plant. I venture to think that there were more rare species of plants in these few acres than are to be found in many a so-called 'Botanic Garden'. At the risk of being pedantic and for the purpose of proving my point, let me enumerate those I saw in the brief period of my stay there. I only noted those which attracted my fancy. Rosa sericea petrolutea, Himalayan rose. Dipelta floribunda from Central China, a shrub with pale rose, orange-throated flowers. Rhus cotinus atropurpureus (Rehder's Cotinus coggygria, Scop.), a charming form of the smoke tree. Ribes speciosum var. fuchsioides, an evergreen shrub with flowers like fuchsias which, in its simpler form, is wild in California. Rubus deliciosa, a handsome, large, white-flowered raspberry from Colorado. Phygelius capensis, a handsome Scrophulariaceae from the Cape, known as the Cape Figwort. Eleagnus reflexa, a variety, according to Rehder, of E. pungens from Japan. Callicarpa chenaulti, a species which I find described nowhere in my books."

CALLICARPA CLEMENSORUM Moldenke, Phytologia 5: 7—8. 1954.

Bibliography: Moldenke, Phytologia 5: 7—8 & 29. 1954; Moldenke, Biol. Abstr. 29: 2935. 1955; Moldenke, Résumé 192 & 443. 1959.

Shrub or tree; branchlets very coarse, stout, medullose, conspicuously tetragonal, flattened toward the apex, floccose-tomentose on the younger parts, glabrescent in age, with scattered short aculeations which wear off on the older wood; nodes conspicuously annulate; principal internodes 4.5—7 cm. long; leaves decussate-opposite; petioles very stout and heavy, 3.5—6 cm. long, densely floccose-tomentose with grayish hair like the branchlets; leaf-blades subcoriaceous, grayish-green on both surfaces, broadly elliptic, 14—19.5 cm. long, 8—10 cm. wide, short-acuminate at the apex, rounded at the base, regularly serrate from just above the base to the apical acumination, rather densely furfuraceous above when young, but this tomentum soon wearing off irregularly and the mature leaves glabrous above except for the midrib, densely furfuraceous-tomentose beneath with grayish hair; midrib rather stout, slightly prominent or flat and persistently furfuraceous above, very conspicuously rounded-prominent beneath; secondaries slender, 9—11 per side, arcuate-ascending, flat above, prominent beneath, inconspicuously anastomosing at the margins; veinlet reticulation very abundant, mostly obscure above, prominulous beneath; inflorescence axillary, cymose; cymes 2 per node, about as long as the subtending petioles, about twice bifurcate, very loose and open, the ultimate furcations terminated by a very dense head-like cluster of 15—20 subsessile flowers; peduncles rather stout, about 3 cm. long, densely floccose-tomentose; inflorescence-branches elongate, 1—2.5 cm. long, densely floccose-tomentose with grayish hairs like the peduncles; bracts

very conspicuous, a pair beneath each furcation of the cyme and numerous among the flowers, 4--15 mm. long, linear-subulate, densely floccose-tomentose; calyx campanulate, 2--2.5 mm. long, very densely grayish-tomentose, its rim 4-toothed; corolla scarcely surpassing the calyx, glabrous; stamens 4, long-exserted; filaments about 5 mm. long, glabrous; pistil one, long-exserted, about equaling the stamens or somewhat surpassing them; style 6--7 mm. long, glabrous; stigma peltate-capitate.

The type of this distinctive species was collected by Joseph and Mary Knapp Clemens (no. 34036) in the Penataran River basin, British North Borneo, on July 22, 1933, and is deposited in the Herbarium Bogoriense at Buitenzorg, Java. The taxon is known to me only from the original collection, of which I have examined 4 specimens, including the type.

Citations: INDONESIA: GREATER SUNDA ISLANDS: British North Borneo: Clemens & Clemens 34036 (Bz--18332--isotype, Bz--18333--isotype, Bz--18334--type, Z--isotype).

CALLICARPA COLLINA Diels, Notizbl. Bot. Gart. Berlin 9: 1030. 1926.

Synonymy: Callicarpa brevipes f.yingtakensis P'ei, Mem. Sci. Soc. China 1 (3): [Verbenac. China] 47. 1932.

Bibliography: Diels, Notizbl. Bot. Gart. Berlin 9: 1030. 1926; P'ei, Mem. Sci. Soc. China 1 (3): [Verbenac. China] 16 & 47--49, pl. 5. 1932; A. W. Hill, Ind. Kew. Suppl. 8: 37. 1933; Worsdell, Ind. Lond. Suppl. 1: 160. 1941; Moldenke, Known Geogr. Distrib. Verbenac., ed. 1, 56 & 86 (1942) and ed. 2, 130 & 177. 1949; Moldenke, Alph. List Cit. 4: 1011. 1949; Moldenke, Résumé 168 & 443. 1959; Moldenke, Résumé Suppl. 14: 6. 1966; Moldenke, Phytologia 14: 102. 1966.

Illustrations: P'ei, Mem. Sci. Soc. China 1 (3): [Verbenac. China] pl. 5. 1932.

Small woody shrub, 1--1.6 m. tall, with a spread of 1 m.; stems fulvo-tomentellous, finally glabrescent; branchlets pubescent; leaves decussate-opposite, sessile or subsessile to short-petiolate; petioles, if present, not surpassing 7 mm. in length; leaf-blades herbaceous or chartaceous, ovate-lanceolate or oblanceolate, 8.5--25 cm. long, 3.3--8 cm. wide, the larger leaves always at the upper parts of the branchlets, the upper ones acuminate or long-acuminate at the apex, the lower ones obtuse or rounded, all crenately serrate, minutely callose-serrulate, or entire along the margins, narrowed to the subcordate or rounded base, almost glabrous above, scattered stellate-pilose beneath or merely densely pubescent along the venation beneath; secondaries 8--12 per side; peduncles about 4 mm. long, densely pubescent; flowers small; calyx 0.6 mm. long; corolla white or pinkish-white, glabrous, its tube about 1.8 mm. long, the lobes 1 mm. long; anthers exserted, opening by means of an apical pore; immature fruit light-green, about 3.5 mm. wide, glandular.

The type of this species was collected by Hsen-Hsu Hu (no. 1250) on shady hillsides at Tzuchi-hsien, at 600 meters altitude,

Kiangsi, China, on July 12, 1921, and was deposited in the herbarium of the Botanischer Garten in Berlin, but is now destroyed. Diels (1926) says: "A C. rubella Lindl. affinis ramis robustioribus, foliis majoribus fere integris, basi ipsa vix cordatis, inflorescentia densius conferta, corolla glabra, filamentis brevioribus distinguitur". P'ei (1932) cites an isotype in the Arnold Arboretum herbarium and also Hu 1125 from Kiangsi.

The plant has been found growing on shady hillsides, in shady places in valleys, in dry places along roadsides, near streams, and on dry level land, at altitudes of 600 to 930 meters, flowering from May to July. The flowers are described as "white" on Hu 1125 & 1250, Lau 20221, and Tsang 20416, and as "pinkish-white" on Tsang 20606.

P'ei (1932), in his description, says that the leaves are "5—8 mm. longe", but this is surely an error for "lata"; he notes that Hu 1125 has larger leaves than the type collection, "but the other characters are identical". He says that "The species is related to Callicarpa Lingii Merr. from which it differs by its narrower leaves which are pubescent beneath and cuneate at the base." In speaking of C. lingii, he says "It is related to Callicarpa collina Diels from which it differs by its sessile and cordate leaves which are nearly glabrous, while the leaves of C. collina Diels are pubescent beneath at least along the nerves, cuneate at base and narrow lanceolate." His C. brevipes f. yingtakensis is said to differ from the typical form of C. brevipes and the other named forms of that species in having sessile or subsessile leaves, the blades ovate-lanceolate, acuminate at the apex, subcordate to rounded at the base, and crenate-serrate or entire along the margins. The type was collected by Y. K. Wang (no. 2902) in woods at Yingtak, Kwangtung, China, in July, 1929, and is deposited in the Britton Herbarium at the New York Botanical Garden.

In all, 7 herbarium specimens and one mounted photograph, including type or phototype material of all the names involved, have been examined by me.

Citations: CHINA: Kiangsi: Hu 1250 (N—photo of isotype). Kwangtung: S. Y. Lau 20221 (N), 20274 (N); W. T. Tsang 20416 (Ba, N, W—1753643), 20606 (N); Y. K. Wang 2902 (N).

CALLICARPA CRASSINERVIS Urb., Symb. Antil. 7: 357. 1911.

Additional & emended synonymy: Callicarpa fulva Griseb. ex Urb., Symb. Antil. 7: 357, in syn (in part). 1911 [not C. fulva A. Rich., 1850, nor A. Rich. apud Millsp., 1936]. Callicarpa rugaefolia C. Wright ex Moldenke in Fedde, Repert. Spec. Nov. 40: 65 & 66, in syn. 1936. Callicarpa crassifolia Moldenke, Brief Course Syst. Bot. Lect. 9: 2, sphalm. 1937.

Bibliography: A. Rich. in Sagra, Hist. Cuba 2 (11): 145. 1850; Griseb., Pl. Wright. 2: 529. 1862; Prain, Ind. Kew. Suppl. 5: 43. 1921; Moldenke in Fedde, Repert. Spec. Nov. 39: 300 (1936) and 40: 57—59, 65—67, 119, 126, & 131. 1936; Moldenke, Brief Course Syst.

Bot. Lect. 9: 2. 1937; Moldenke, Geogr. Distrib. Avicenn. 4. 1939; Moldenke, Brief Course, Syst. Bot., ed. 2, 48. 1939; Moldenke, Prelim. Alph. List Invalid Names 10 & 13. 1940; Moldenke, Known Geogr. Distrib. Verbenac., ed. 1, 24 & 86. 1942; Moldenke, Alph. List Invalid Names 9 & 11. 1942; Moldenke, Alph. List Cit. 1: 273 & 306. 1946; Moldenke, Brief Course Elem. Syst. Bot. 53. 1947; Moldenke, Alph. List Cit. 2: 420 (1948), 3: 664 (1949), and 4: 1143. 1949; Moldenke, Known Geogr. Distrib. Verbenac., ed. 2, 42 & 177. 1949; Alain in León & Alain, Fl. Cuba 4: 305 & 309. 1957; Moldenke, Résumé 50, 243, 247, & 443. 1959; Moldenke, Phytologia 7: 27. 1959; Moldenke, Résumé Suppl. 13: 6. 1966; J. A. Clark, Card Ind. Gen. Sp. Pl. n.d.

It should be noted here that C. fulva Griseb. is in part C. crassinervis Urb. and in part C. grisebachii Urb.; A. fulva A. Rich. is a valid species, but C. fulva "A. Rich. apud Millsp." is C. hitchcockii Millsp.

In all, 31 herbarium specimens, including type material of all the names involved, and 22 mounted photographs and other illustrations have been examined by me.

Additional & emended citations: CUBA: Oriente: Acuña, Alonso, & Pina 18800 (Es); Clemente 6617 (Z); Linden 2006 (B--photo, Br, P, P, S--photo), 2061, in part (Br); C. Wright 1357, in part [Jan.--Jul. 1859] (Br--isotype, D--612064--isotype, E--119140--isotype, E--photo of type, F--183674--isotype, I--photo of isotype, Mi--photo of isotype, S--photo of type, W--photo of type).

CALLICARPA CUBENSIS Urb., Symb. Antil. 5: 485--486. 1908.

Additional & emended synonymy: Aegiphila incana Turcz., Bull. Soc. Imp. Nat. Mosc. 36 (2): 218. 1863 [not Callicarpa incana Roxb., 1814]. Callicarpa reticulata A. Rich. apud Urb., Symb. Antil. 5: 485, in syn. 1908 [not C. reticulata Poepp., 1845, nor Sw., 1788]. Callicarpa incana (Turcz.) Moldenke, Torreya 34: 8. 1934. Callicarpa rugosa Sessé & Moc. ex Moldenke, Prelim. Alph. List Invalid Names 13, in syn. 1940. Callicarpa incana (F.) Moldenke ex Roig y Mesa, Dicc. Bot. 274, sphalm. 1953. Callicarpa cubensis var. cubensis Alain in León & Alain, Fl. Cuba 4: 305. 1957.

Bibliography: Sw., Prodr. 31. 1788; Schau. in A. DC., Prodr. 11: 642. 1847; A. Rich. in Sagra, Hist. Cuba 2 (11): 144. 1850; Griseb., Fl. Brit. West Ind. 499. 1861; Turcz., Bull. Soc. Imp. Nat. Mosc. 36 (2): 218. 1863; Sauv., Fl. Cub. 113, no. 1775. 1868; Jacks. in Hook. f. & Jacks., Ind. Kew. 1: 46. 1893; Urb., Symb. Antil. 5: 485--486 (1908) and 7: 356. 1911; Prain, Ind. Kew. Suppl. 4: 34. 1913; Urb., Arkiv Bot. Stockh. 22a (17): 108. 1929; Moldenke, Torreya 34: 8. 1934; Moldenke in Fedde, Repert. Spec. Nov. 39: 300 (1936), 40: 50, 53, 69--71, 82, 83, 104, 117, & 119--131 (1936), and 42: 242. 1937; A. W. Hill, Ind. Kew. Suppl. 9: 45. 1938; Moldenke, Alph. List Common Vern. Names 12. 1939; Moldenke, Geogr. Distrib. Avicenn. 4, 6, & 35. 1939; Mol-

denke, Prelim. Alph. List Invalid Names 2 & 11—13. 1940; Moldenke, Known Geogr. Distrib. Verbenac., ed. 1, 24, 25, 71, & 86. 1942; Moldenke, Alph. List Invalid Names 2 & 9—11. 1942; Moldenke, Phytologia 2: 94. 1945; Moldenke, Alph. List Cit. 1: 4, 15, 24, 63, 65, 66, 112, 136, 184, 186, 187, 208, 246, 273, 286, 307, 310, & 312 (1946), 2: 339, 347, 420, 458, 470, 487, 490, 499, 525, 631, 645, 646, 648, & 651 (1948), 3: 757, 774, 801, 823, 868, 880, 889, 924, & 925 (1949), and 4: 1027, 1033, 1035, 1085, 1143—1145, 1207, & 1303. 1949; Moldenke, Known Geogr. Distrib. Verbenac., ed. 2, 42, 45, 46, 157, & 177. 1949; H. N. & A. L. Moldenke, Anal. Inst. Biol. Mex. 20: 3. 1950; Moldenke, Phytologia 3: 484, 487, & 488. 1951; Moldenke, Inform. Mold. Set 46 Spec. 2. 1951; Moldenke, Biol. Abstr. 26: 643. 1952; Roig y Mesa, Dicc. Bot. 274. 1953; Moldenke, Phytologia 4: 450. 1953; Alain in León & Alain, Fl. Cuba 4: 304 & 305. 1957; Moldenke, Résumé 50, 53, 54, 213, 229, 240, 242, 243, 246, 247, & 443. 1959; Moldenke, Phytologia 7: 27. 1959; J. A. Clark, Card Ind. Gen. Sp. Pl. n.d.

Urban (1908) apparently based this species on five collections, all made in Cuba: Sagra s.n. [=210] from Havana, Charles Wright 3172 from Boca de Camarioca, Havana, C. F. Baker 5176 and Van Hermann 5078 from Havana, and Rugel 352 from Cajimar, Havana, all deposited in the herbarium of the Botanisches Museum in Berlin, but now destroyed. Of these, Sagra 210 has been chosen as the lectotype. The various Sagra specimens without a number, in various herbaria, and cited by myself in my 1936 work and by other authors, appear to be a part of Sagra 210. The type of C. rugosa is Sessé, Mociño, Castillo, & Maldonado 516, from somewhere in Cuba, deposited in the Madrid herbarium.

Urban (1908) observes that "Planta jamaicensis, C. reticulata Sw., temporibus recentioribus non collecta et in museo Holmiensi ex cl. Lindman in lit. deficiens e descriptione foliis elliptico-lanceolatis, calyce breviter 4-fido, stylo bifido, baccis extus sericeis sine dubio diversa est". In speaking of his C. selleana (1929) he says "Affinis Callicarpa cubensi Urb., quae foliis basi rotundatis margine integris, inflorescentiis amplioribus distat". In speaking of his C. sordida (1911) he notes "Longius distant Callicarpa cubensis Urb."

In my 1936 work I adopted the name, C. incana (Turcz.) Moldenke, for this taxon, but this binomial proves to be a later homonym of the C. incana of Roxburgh [=C. macrophylla Vahl]. Most of the specimens annotated by me at that time were returned to various herbaria with the incorrect annotation.

Recent collectors describe C. cubensis as a shrub, to 1.8 m. tall, the flowers pink, light pink-violet, lilac, or purple, and the fruit pink. It has been found growing in thickets, thickets near brooks, and palm barrens, as well as at river edges, fruiting in May. Webster describes it as a common shrub on limestone cliffs. The corollas are described as "lilac" on Ekman 12875 & 16840, "light pink-violet" on Ekman 17316, "pink" on Webster 3709,

and "purple" on C. Wright 3172.

It should be noted here that the C. reticulata Sw., referred to in the synonymy above, is a valid species, while C. reticulata Poepp. is a synonym of Petitia domingensis Jacq.

Turczaninow's original description of Aegiphila incana (1863) is: "Ae. ramis, petiolis et panicula pulverulento-incanis; foliis ellipticis, ovatis obovatisve utrinque obtusis, rarius apice acutiusculis, margine revolutis integerrimis, crebre reticulatis, supra pulverulentis punctatisque, subtus ob rete elevatum rugosissimis, flavido-albicantibus; cymis terminalibus folia subaequantibus; calycibus turbinatis corollae tubo latioribus atque sublongioribus; genitalibus exsertis. Folia in genere parva, pollice breviora. Cuba, Ramon de la Sagra."

Roig y Mesa (1953) records the vernacular name "cerato" and notes "Arbusto propio de sabanas de serpentina.....Es una especie de Filigrana, común en Guabasiabo, Holguín". The names "filigrana" and "filigrana de mazorquilla" are also recorded for it.

Material has been misidentified and distributed in herbaria as C. reticulata Sw. and as C. tomentosa (L.) Murr.

The late W. H. Camp in 1935 examined a series of specimens of C. cubensis at my request and presented the following report: "I find some variation in the teeth of the calyx-rim in the material examined. This information is supplied herewith by means of diagrams at approximately x10 diam. magnification, with the following observations.

"The material fell roughly into two groups based on the depth of the sinus between the lobes and the acuteness of the lobe itself. There was also some correlation between this character and one other -- namely the pubescence of the inflorescence axis and stem. No other correlations — e.g., leaf-shape, size, pubescence, color, bracts, pedicels, flowers — could definitely be established owing to the lack of sufficient material in exactly comparable stages. The pubescence of the leaves seemed to be fairly well correlated with that of the inflorescence axis.

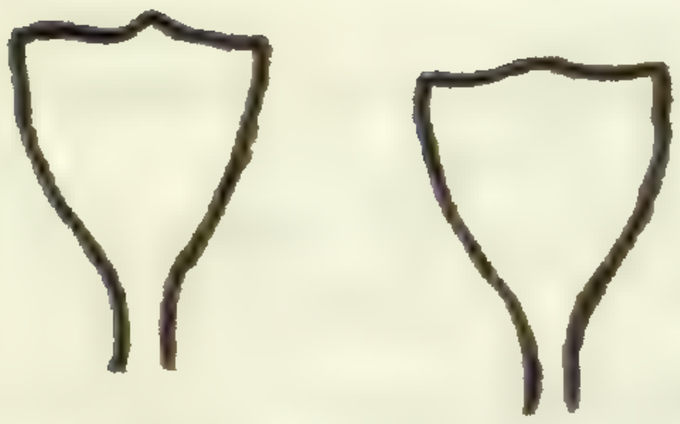
"The following is a list of the specimens examined: (1) With low and fairly blunt calyx-teeth, the inflorescence with short pubescence: Britton, Britton, & Shafer 126, Britton & Earle 7607, Britton, Earle, & Wilson 404, León 971, Rugel 352, Sagra s.n. (2) With prominent and somewhat sharper calyx-teeth, the inflorescence axis with an obviously subpilose pubescence: Britton & Wilson 5654, Curbelo 6194, León, Edmund, & Fortún 8566. (3) Two intermediates were also noted with the deeper sinuses of the second group, but with the blunt teeth and short pubescence of the first group: Baker 5176, Van Hermann 5078.

"The writer -- even without the Van Hermann and Baker numbers -- would hesitate before admitting two species, or even two well-defined varieties. It is quite possible that earlier workers thought that the calyx was 'truncate', because it often has a peculiar way of drying with the points inflexed (as in the Sagra

collection). Since the sinuses are heavily covered with hairs and the points less so, the hairs tend to 'level off' the calyx-rim to the casual observer. In the drawings I have tried to ignore the pubescence of the calyx."

Casual observation

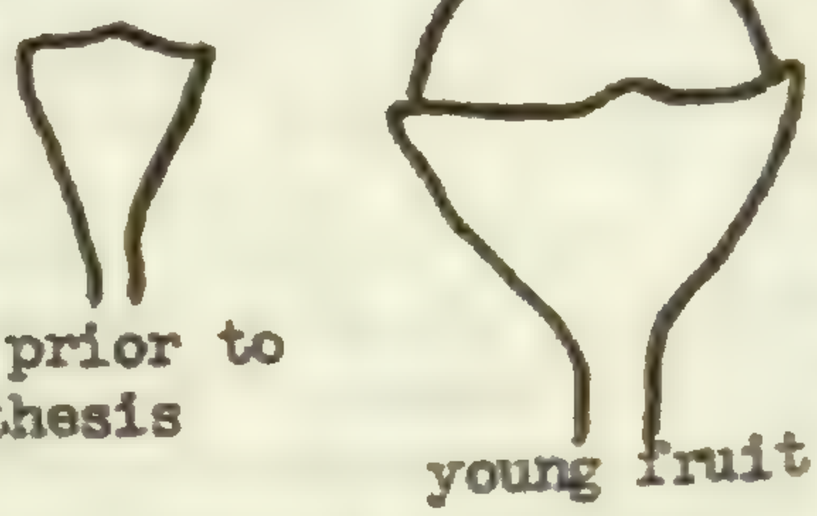
Optical section



Britton, Britton, & Shafer 126

full flower

Britton, Earle, & Wilson 6242



just prior to anthesis

young fruit

Britton & Earle 7607

Britton & Wilson 404

León 971

flower

young fruit

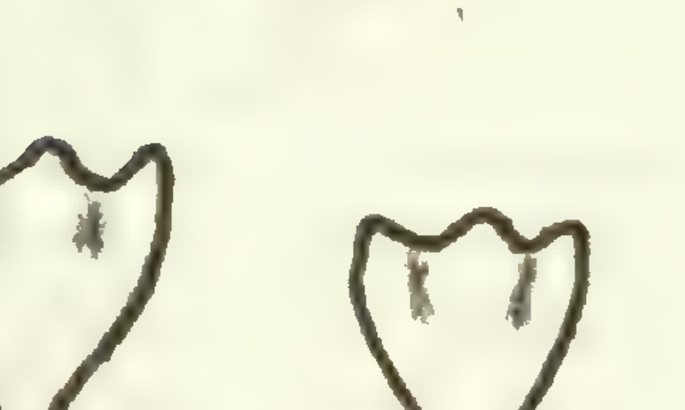
Rugel 352

Sagra s.n.

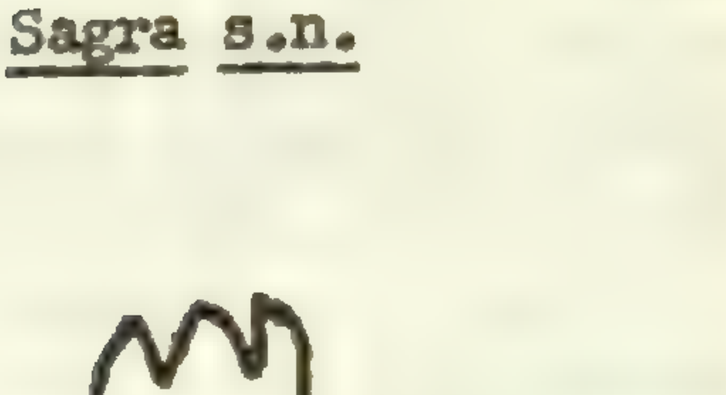
Britton & Wilson 5654

bud prior to anthesis

Curbelo 6194



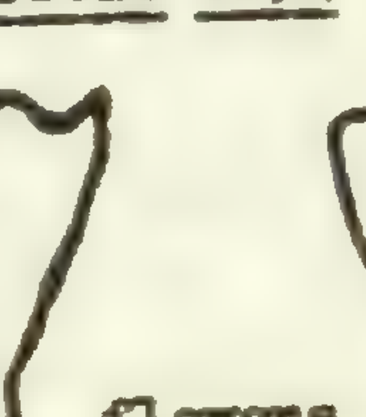
flowers



flowers

young fruit

León, Edmund, & Fortín 8566



young fruit

C. F. Baker 5176

flower

young fruit

Van Hermann 5078

In all, 134 herbarium specimens and 40 mounted photographs, including type or phototype material of all the names involved, have been examined by me.

Additional & emended citations: CUBA: Camagüey: León 16263 (Ha, N). Havana: C. F. Baker 5126 (Ca—140132, F—187195, Gg—31980, Oa, Po—64812, W—429474); Britton, Earle, & Wilson 6242 (F—284179); Guio 13 (Q); León 250 (Se—28355), 971 (Ha, Vi), 5689 (Ha, N), 6238 (Ha, N, Vi), 7218 (Ha, Ha, N), 13757 (Ha, N, Y—16324); Moldenke & Moldenke 19866 (Es, Lg, N, Ot, Sm); Sagra 12 (Dc, Dc, Dc), 210 (E—photo of type, F—976786—isotype, Mi—photo of isotype, S—photo of type, V—isotype, W—photo of type); Van Hermann 5078 (Po—64814); G. L. Webster 3709 (Mi, Mi); C. Wright 3172 [1860—1864; Herb. Sauvalle 1775] (E—119135, F—244618, Hv, I—photo, Pa), 3172 [1865; Herb. Sauvalle 1775] (Hv). Las Villas: Alain 4003 (Z); Britton & Wilson 5654 (Mi—photo, W—658694); Ekman 16840 (Mi, N); León, Edmund, & Fortún 8566 (Ha). Matanzas: Britton, Britton, & Shafer 126 (Cm). Pinar del Río: Acuña & Alain 15837 (Es), 18545 (Es); Acuña & Roig 10872 (Es); Alain & Acuña A.1209 (N); Britton & Earle 7607 (F—285759, W—696819); Ekman 12875 (N), 17316 (Mi, N). Province undetermined: Auber 4 (D—612061, D—612062); Collector undesignated 15 (Q); Herb. Short s.n. (E—119134); Sagra 514 (Dc); Serre s.n. (P); Sessé, Mociño, Castillo, & Maldonado 516 [296] (F—850973, Q).

CALLICARPA CUBENSIS var. PARVIFLORA Moldenke, Phytologia 3: 487—488. 1951.

Synonymy: Callicarpa cubensis var. parvifolia Moldenke, Phytologia 3: 484, nom. nud. 1951.

Bibliography: Moldenke, Phytologia 3: 484 & 487—488. 1951; Moldenke, Inform. Mold. Set 46 Spec. 2. 1951; Moldenke, Biol. Abstr. 26: 643 & 3446. 1952; Moldenke, Phytologia 4: 450. 1953; Alain in León & Alain, Fl. Cuba 4: 305. 1957; Moldenke, Résumé 50, 242, 418, & 443. 1959.

This variety differs from the typical form of the species in having its leaf-blades much smaller and narrower, 1.2—2.7 cm. long and 5—10 mm. wide when mature.

The type of the variety was collected by Julián Baldomero Acuña Galé and Juan Tomás Roig y Mesa (no. 16765) at La Cajabana, La Palma, Pinar del Río, Cuba, on March 8, 1951, and is deposited in the Britton Herbarium at the New York Botanical Garden. Through an unfortunate error in transcription, the varietal name was officially and validly published as "parviflora". There are, however, hundreds of similarly inappropriate epithets in use today for other plants and I see no valid reason for proposing a change. After all, a name is now intended as an identifying label for a taxon, not as a description of it as it was in earlier times!

Material of this variety has been misidentified and distributed in herbaria as C. shaferi Britton & P. Wils. In all, 3 her-

barium specimens, including type material of both names involved, have been examined by me.

Citations: CUBA: Pinar del Río: Acuña & Roig 16765 (Es--isotype, Lm--isotype, N--type).

CALLICARPA CUNEIFOLIA Britton & P. Wils., Mem. Torrey Bot. Club 16: 97. 1920.

Bibliography: Britton & P. Wils., Mem. Torrey Bot. Club 16: 97. 1920; Urb. in Fedde, Repert. Spec. Nov. 18: 120. 1922; A. W. Hill, Ind. Kew. Suppl. 6: 34 (1926) and 7: 35. 1929; Moldenke in Fedde, Repert. Spec. Nov. 39: 299 (1936) and 40: 53--54, 119, 123, 129, & 130. 1936; Moldenke, Geogr. Distrib. Avicenn. 4. 1939; Moldenke, Known Geogr. Distrib. Verbenac., ed. 1, 24 & 86. 1942; Moldenke, Alph. List Cit. 1: 184--186 (1946), 3: 929 (1949), and 4: 1016 & 1034. 1949; Moldenke, Known Geogr. Distrib. Verbenac., ed. 2, 42 & 177. 1949; Alain, Rev. Soc. Cub. Bot. 13: 37. 1956; Alain in León & Alain, Fl. Cub. 4: 305 & 307. 1957; Conde, Hist. Bot. Cub. 221. 1958; Moldenke, Résumé 50 & 443. 1959; J. A. Clark, Card. Ind. Gen. Sp. Pl. n.d.

Morton found this plant growing in Pinus cubensis woods on limonite and says: "agrees with isotype of cuneifolia in U. S. Nat. Herb., but in my opinion the species is too close to C. ferruginea Swartz. C. revoluta Moldenke seems to be the same also". Material has been misidentified and distributed in herbaria as C. nipensis Britton & P. Wils.

In all, 11 herbarium specimens, including the type, and 6 mounted photographs have been examined by me.

Additional & emended citations: CUBA: Oriente: Alain & López Figueiras 4848 (Z); Ekman 3497a (N); Marie-Victorin & Clément 21730 (Um--25259, Um--25378); Shafer 7741 (W--696369--isotype).

CALLICARPA DENTICULATA Merr., Philip. Journ. Sci. Bot. 3: 430--431. 1909.

Bibliography: E. D. Merr., Philip. Journ. Sci. Bot. 4: 430--431. 1909; Prain, Ind. Kew. Suppl. 4: 34. 1913; H. J. Lam, Verbenac. Malay. Arch. 48, 65--66, & [361]. 1919; Bakh., Bull. Jard. Bot. Buitenz., ser. 3, 3: 27. 1921; E. D. Merr., Enum. Philip. Pl. 3: 383. 1923; Moldenke, Alph. List Common Verb. Names 2 & 21. 1939; Moldenke, Known Geogr. Distrib. Verbenac., ed. 1, 62 & 86. 1942; Moldenke, Phytologia 2: 94. 1945; Moldenke, Known Geogr. Distrib. Verbenac., ed. 2, 140 & 177. 1949; Moldenke, Résumé 182 & 443. 1959; Hatusima, Mem. Fac. Agr. Kagoshima Univ. 5 (3): 17 & 47. 1966; Moldenke, Résumé Suppl. 14: 4. 1966.

Shrub or small tree, 2--3 m. tall; branches light-gray, glabrous; branchlets densely or very densely stellate-hairy or stellate-plumose-pubescent; leaves decussate-opposite; petioles 1--1.5 cm. long, densely stellate-hairy or stellate-plumose-pubescent, subglabrous or glabrescent in age; leaf-blades submembranous, ovate to broadly elliptic or elliptic-obovate, 10--15 cm. long, 5--9 cm. wide, short-acuminate at the apex, dentate along the margins, acute or subacute to rounded or rarely slightly

cordate at the base, glabrous and shiny above when mature or with some stellate hairs on or along the venation, paler and scattered stellate-hairy and densely glandular-dotted with numerous, shiny, minute, yellow glands beneath; secondaries 5 or 6 pairs, very prominent; veinlet reticulation distinct, brown; cymes solitary, only in the upper leaf-axils, 5 cm. long or less, pedunculate, dichotomous, many-flowered, more or less stellate-pubescent or densely stellate-hairy and plumose; calyx cupuliform, 1.5 mm. long, with a few scattered stellate hairs and minute yellow glands, the rim obscurely 4-toothed; corolla lilac or purplish, nearly 4 mm. long, ampliate upwards, slightly glandular and sparsely hairy with widely scattered hairs, the lobes elliptic, about 1 mm. long, obtuse at the apex; stamens 6 mm. long, long-exserted; filaments about 6 mm. long; anthers glandular, 1.6 mm. long; style very slender, 1 cm. long; ovary somewhat depressed-globose; fruit globose, about 3 mm. wide.

The species was based by Merrill on two collections made by Eugenio Fénix, one [Philip. Bur. Sci. 4023] from Camiguin, and the other [Philip. Bur. Sci. 3622] from Santo Domingo de Basco, Batan, Philippine Islands, on May 30, 1907, both deposited in the herbarium of the Bureau of Science in Manila, but now unfortunately destroyed. Merrill (1909) says: "A species well characterized by its relatively broad leaves, few cymes, and these only in the upper axils, the very long-exserted stamens and style. It has more the facies of Premna than of Callicarpa." The common names "anaif" and "mayop" are recorded for this plant, and it has been found growing in the littoral bush.

Lam (1919) notes also that "Its habit reminds us that of a Premna". Hatusima (1966) places C. kotoensis Hayata, C. japonica var. kotoensis (Hayata) Masamune, and C. longifolia sensu Li in synonymy under C. denticulata, but I regard these three names as belonging in the synonymy of C. japonica var. luxurians Rehd. His Botel Tobago record, therefore, is to be excluded. He also records C. denticulata from Babuyan and cites his nos. 28691 and 29198. The "Datan" record in my Résumé (1959) appears to be a typographic error for "Batan". The species is known to me only from the literature.

CALLICARPA DICHOTOMA (Lour.) K. Koch, Dendrol. 336. 1872.

Additional & emended synonymy: Porphyra dichotoma Lour., Fl. Cochinch., ed. 1, 1: 70. 1790. Callicarpa dichotoma Raeusch., Nom. Bot., ed. 3, 37, nom. nud. 1797. Callicarpa purpurea A. L. Juss., Ann. Mus. Hist. Nat. Paris 7: 67. 1806. Callicarpa foliis subsessilibus, lanceolatis, serratis; racemis dichotomis Poir. in Lam., Encycl. Méth. Suppl. 2: 34, in syn. 1811. Callicarpa fruticosa: ramulis partibusque junioribus obsolete squamosis: foliis subsessilibus, lanceolatis, acuminatis, serratis, basi cuneatâ subintegerrimis, supra glabris, subtus glandulose punctatis; corymbis axillaribus, parvis, dichotomis; floribus glandulosis Roxb. apud J.

A. & J. H. Schult., Mant. 3: 54, in syn. 1827. Callicarpa gracilis Rheede ex Sieb., Jaarb. Konink. Nederl. Maatsch. Aanmoed. Tuinbouw [Ann. Hort. Pays-Bas], ser. 3, 1845: 72. 1845. Callicarpa gracilis Sieb. & Zucc., Abh. Akad. Muench. 3 (4): 154—155. 1846. Callicarpa jamamurasaki Sieb. ex Miq., Ann. Mus. Bot. Lugd.-Bat. 2: 98. 1865. Callicarpa japonica var. angustifolia Savatier, Livres Kwa-wi 78. 1873. Callicarpa sieboldii Zipp. ex H. J. Lam, Verbenac. Malay. Arch. 83, in syn. 1919. Callicarpa dichotoma (Lour.) Raeusch. apud Bakh., Bull. Jard. Bot. Buitenz., ser. 3, 3: 25, in syn. 1921; Nakai, Fl. Sylv. Kor. 14: 28. 1923. Callicarpa japonica var. dichotoma (Lour.) Bakh., Bull. Jard. Bot. Buitenz., ser. 3, 3: 125. 1925. Callicarpa dichotoma (Lour.) Merr. ex P. Dop, Bull. Soc. Hist. Nat. Toulouse 64: 507. 1932. Callicarpa koreana Hort. ex Vilm., Bull. Soc. Dendr. France 87: 82, nom. nud. 1933. Galphimia hirsuta Hort. ex Moldenke in Fedde, Repert. Spec. Nov. 40: 84, in syn. 1936 [not G. hirsuta Cav., 1799]. Callicarpa muricata Hort. ex Moldenke, Prelim. Alph. List Invalid Names 12, in syn. 1940. Callicarpa sinica Colebrooke ex Moldenke, Prelim. Alph. List Invalid Names 13, in syn. 1940. Callicarpa japonica var. dichotoma Bakh. apud Rehd., Bibl. Cult. Trees 583, in syn. 1949. Callicarpa dichotoma K. Koch ex Kasapligil, Pl. Jordan 102. 1956.

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Illustrations: Sieb., Jaarb. Konink. Nederl. Maatsch. Aanmoed. Tuinbouw [Ann. Hort. Pays-Bas], ser. 3, 1845: pl. 5 & 6. 1845; Van Houtte, Fl. Serres, ser. 2, 3: pl. 1359 [in color]. 1858; Lindl., Gard. Chron. 1859: 96. 1859; Groenland, Rev. Hort., ser. 4, 8: 106 & 107. 1859; Lem. & Verschaf., Illustr. Hort. 6: pl. 202 [in color]. 1859; E. G. & A. Henderson, Illustr. Bouquet 2: pl. 29 [in color]. 1859—1861; Hérincq, Hort. Franç., ser. 2, 3: pl. 4. 1861; Floral World & Gard. Guide 4: 192. 1861; Bocq., Adansonia 3: pl. 8, fig. 8—11. 1863; Bocq., Rev. Verbenac. pl. 8, fig. 8--11. 1863; M. T. Masters, Gard. Chron. 1871: 173, fig. 38. 1871; W. Robinson, The Garden 23: pl. 392 [in color]. 1883; Milner, Gard. Chron., ser. 3, 10: 101, fig. 13. 1891; Shirasawa, Bull. Coll. Agr. Tokyo Imp. Univ. 2: [Jap. Laubh. Winterzust.] pl. 14, fig. 9. 1895; Briq. in Engl. & Prantl, Nat. Pflanzenfam. 4 (3a): 165, fig. 62B. 1895; Apgar, Ornament. Shrubs U. S. fig. 505. 1910; C. K. Schneid., Illust. Handb. Laubholzk. 2: 587 & 593, fig. 385m. 1911; Varacek, Oesterr. Gart.-Zeit. 8: 277, fig. 115. 1913; Nakai, Fl. Sylv. Kor. 14: pl. 5. 1923; Nakai, Trees & Shrubs Indig. Jap., ed. 2, 1: 451, fig. 213. 1927; Hottes, Book Shrubs, ed. 1, 148. 1928; Blossfeldt, Art Forms in Nature pl. 9a. 1929; Hottes, Book

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Loureiro's original (1790) description of this plant is: "foliis lanceolatis: racemis dichotomis. Hab. Frutex erectus, 3-pedalis: ramis multis, rectis, debilibus. Folia lanceolata, serrata, punctata, subsessilia, opposita. Flos purpureus, racemis dichotomis, axillaribus. Bacca globosa, violacea, carnosa, plurima, minima. Habitat in collibus provinciae Cantoniensis Sinarum." The type of C. sinica was collected by Nathaniel Wallich (no. 523) from cultivated material in the Calcutta Botanical Garden, Bengal, India, and is deposited in the herbarium of the Universitets Botaniske Museum in Copenhagen. The type of C. muricata is Herb. Hort. Bot. Berol. s.n. deposited in the herbarium of the Naturhistoriska Riksmuseum at Stockholm.

Recent collectors describe this plant as a shrub, small shrub, undershrub, or bush, woody, erect, and bushy, or even as a climber or vine [Chiao 2787], 2--10 feet tall, with a spread of 1 meter, the stem to 1 inch in diameter, the branches purplish, bark pinkish, buds lavender, flowers fragrant, corolla pink, pinkish, or purplish-pink to pinkish-red, purplish, purple, white, or "white and red", and the fruit globular, at first green, then yellow, red, purplish-red, or "somewhat red", and finally lilac, purplish-lilac, lavender, purple, violet, "beautifully violet", or even "black", shiny, 1/12 inch in diameter. The Nut Trees Nurseries catalogue (1959) describes the fruit as "berries in pendulous ropes". The flowers are said to have been "pink" on Charette 1896, Lau 20141, Tsang 23862, and Tso 20407, "pinkish" on Chiao 2787, "pinkish-red" on Hu 1634, "purplish-pink" on Tso 815, "purplish" on Keng 472, "purple" on Peng, Tak, & Kin 199, "white" on Chiao 2617 and Tsang 22540, and "white and red" on Tsui 395.

The species has been found growing on hills and brushy or rocky slopes, under the shade of bamboo, in good soil, dry sandy soil, or silt, in thickets, woods, and forests, loose summer-green woods, pine woods, open sites and open fields, valleys, swamps, upland peat bogs, and rocky streambeds, along streamsides and roadsides, at the foot of hills, the base of mountains, and the base of high embankments in rice fields, at altitudes of 10 to 600 meters, flowering from April to October, and fruiting from June to November. In India it blossoms from April to September and the fruits ripen at the close of the rainy season. Ching states that it is common in Anhwei, but rare in Kwangsi; Wilson reports it rare in Korea; Fosberg found it "rare in hedgerows between cultivated fields" on

Ikema island. Tsang describes it as fairly common in thickets in Kwangtung, but only as "scattered shrubs" in Kwangsi.

Fox, Godfrey, & Boyce found this species growing wild on the low bank of the Roanoke River in Martin County, North Carolina; Radford found it in an upland peat bog in Henderson County. Tatnall (1947) avers that the historic Delaware station is now destroyed. Gates (1940) reports that it is "seldom spreading" from cultivation in Riley County, Kansas. He refers to it as a nanophanerophyte. Wisler (1942--1943) lists it as cultivated in Delaware County, Pennsylvania. I have personally seen it in cultivation at Great Neck, Long Island, New York, in November, 1938, and at Plainfield, New Jersey, in 1966, but have not made collections from these plants. It was recorded by me (1952) as naturalized in Loudoun County, Virginia. Herb. Arnold Arb. 10151 was growing in Massachusetts from seed collected in Korea by E. H. Wilson. Kasapligil (1956) records it as cultivated in Jordan.

Common names for the plant include "beauty berry", "beautyberry", "Bermuda mulberry", "callicarpe à fleurs purpurines", "Chinese beautyberry", "Chinese callicarpa", "French-mulberry", "Japanese-mulberry", "jewel-berry", "ko murasaki", "ko-murasaki", "komurasaki", "koshikibu", "ko-sikibu", "meka sogi", "murasaki-sibiboo", "mura-saki sikiboo", "purple-mulberry", "purple urn fruit-tree", "purple urn-fruit tree", "sai ip lo hai ngan", "tsu hoa uôn", "tsù-hoa-uôn", and "tsú-kŏa-uôn". Of these "Chinese beautyberry" is the recommended name in English, although the very misleading "French-mulberry" is more often used.

Unfortunately, Raeuschel (1797) says only "Callicarpa dichotoma. Sina. ħ ", with no reference to Loureiro's earlier name and no formal description, so his binomial must be rejected under the present edition of the International Rules of Botanic Nomenclature, although it seems obvious that he intended his binomial as a new combination for Loureiro's Porphyra dichotoma, and many later authors have so regarded it.

Schneider (1911) feels that C. shikokiana Mak. may belong in the synonymy of either the present species or that of C. japonica Thunb., but admits that he never saw any authentic specimen of Makino's plant and that his opinion is based merely on a comparison of the published descriptions. Rehder (1934, 1949) reduces C. taquetii Lévl. to synonymy under C. dichotoma, but I regard Léveillé's taxon as C. japonica var. taquetii (Lévl.) Nakai. In my 1936 work and in subsequent papers I placed C. serrulata Zipp. in the synonymy of C. dichotoma, following Bakhuizen van den Brink (1921), but this name actually belongs in the synonymy of C. elegans Hayek instead. Bakhuizen van den Brink (1921) and Hara (1948) include C. glabra H. J. Lam in the synonymy of C. dichotoma, as I also did in my 1936 work, but Lam's plant is now regarded by me as C. lamii Hosakawa. C. dichotoma var. koreana Hort. is regarded by me as a synonym of C. japonica Thunb.

Roemer & Schultes (1818) describe the fruits of the present

plant as "baccis trispermis". Jussieu (1806), Roxburgh (1820), Hooker & Arnott (1828), and Walpers (1845) all refer to the inflorescences as "corymbs"; actually they are cymes. Santamour (1965) reports the chromosome number as n = 18, and regards the species as tetraploid.

Wallich (1820) says "I cannot but consider this as Loureiro's plant quoted above which Jussieu has justly placed among the genus Callicarpa. It seems to be nearly allied to C. japonica, but differs chiefly in wanting the smoothness, the short stamina and pistillum and the acute stigma of the latter. The flowers are besides of a beautiful purple colour, especially within, while those of Thunberg's plant are white."

Hooker & Arnott (1828) say "Of this we have two forms before us. That from Bonin has oblong-lanceolate gradually acuminated leaves, and axillary corymbs: the other, from Loo Choo, has roundish-oval suddenly acuminated leaves, and the inflorescence from the uppermost axils only. In both, the young foliage is covered, particularly on the under side, with a mealy pubescence, but in the adult state it is glabrous. In many respects both agree with Roxburgh's description in the Flora Indica." Their Ryukiu Islands collection was probably C. japonica Thunb., and that from the Bonin Islands was probably C. glabra Koidz.

Rehder (1916) says of C. dichotoma: "This species is closely related to C. japonica Thunberg, but can be distinguished from it by the young branchlets being slightly grooved or obscurely angled, by the smaller, less acuminate leaves with fewer teeth pointing more or less forward, by the distinctly supra-axillary slender-stalked inflorescence, and by the smaller flowers with the anthers dehiscent to the base. It is of more southern distribution and seems to be confined to southeastern China and southern Japan, where it reaches Yokohama." In his 1927 work he says "E. and C. China, Korea, cult. in Japan; rarely escaped in E. States. Intr. 1857. Zone (V)." Bean (1951) also gives 1857 as the date of introduction into cultivation, but Van Melle (1947) maintains that 1845 is the correct date. According to Roxburgh, however, the species was introduced into cultivation in the Botanic Garden at Calcutta from China in 1812.

Lam (1919), in speaking of C. elegans Hayek, says: "Its affinity is with C. purpurea. Points of difference are the acuminate apex of the leaves, which is never abrupt, and always serrulate, upper side without any hairs and with some glands, and corolla-lobes as long as the tube." In speaking of C. japonica Thunb., he notes that "Its affinity is also with C. purpurea".

P'ei (1932) says: "Callicarpa dichotoma (Lour.) Raeuch., C. japonica Thunb., and C. japonica Thunb. var. angustata Rehd. are very difficult to separate from each other. C. dichotoma.....may be distinguished from its allies by its smaller flowers, leaves, anthers, and fruits. In its long willow-like leaves which are toothed throughout C. japonica.....var. angustata.....differs from C. dichotoma.....which has short ovate leaves, and which are

toothed only in the upper part. C. japonica.....differs from C. dichotoma.....and its variety by its broadly ovate leaves which are usually suddenly acuminate at the apex. The anthers of C. japonica.....and C. japonica var. angustata.....usually open by lateral pores, while those of C. dichotoma.....open by longitudinal slits."

Li (1963) notes that "This species is native to Korea, Japan and central and southern China. It is perhaps the most widely planted species of Callicarpa. It flowers in August and fruits in around October through November. In its native habitat, it prefers moist places and grows especially abundantly at base of hills and along waters.....It was introduced into western gardens around 1857 by Robert Fortune. Lindley (1859) recorded the first fruiting plant in exhibit at the autumn 1858 meeting of the Horticultural Society in St. James' Hall in London 'excited more interest' than any other plant. This species is closely allied to C. japonica, another commonly cultivated species, but is smaller in every respect. The characters that especially distinguish it from the latter are the young branchlets being slightly grooved or angled, the smaller less acuminate leaves with fewer but more forward-pointing teeth along the margins, the distinctly supra-axillary inflorescence, and the smaller flowers with the anthers dehiscing by a longitudinal slit instead of an apical pore. It is also less hardy as in its original home it is generally of a more southern range."

Bailey (1935) lists as handlers of this species Sanford, the Brooklyn Botanic Garden, L. Späth (Berlin), W. T. Hood & Company (Richmond, Virginia), Towsons (Baltimore, Maryland), Paramus Nurseries (Ridgewood, New Jersey), Rhode Island Nurseries (Newport, Rhode Island), Outpost Nurseries (Ridgefield, Connecticut), Henry F. Mitchell (Philadelphia, Pennsylvania), Hill Top (Hartford, Michigan), Joseph Breck & Sons (Boston, Massachusetts), Rosedale Nurseries (Tarrytown, New York), Eastern Nurseries, Howell Nurseries, Princeton Nurseries, Bobbink & Atkins, W. N. Craig, Thompson & Morgan, Royal Botanic Garden (Edinburgh, Scotland), Henry Dreer (Philadelphia, Pennsylvania), Bay State Nurseries (Framingham, Massachusetts), W. A. Manda (South Orange, New Jersey), Cole Nursery Company (Painesville, Ohio), Bristol Nurseries (Briston, Connecticut), Siebenthaler Company (Dayton, Ohio), Storrs & Harrison (Painesville, Ohio), Littlefield-Wyman (North Abington, Massachusetts), and Kallay Brothers (Painesville, Ohio). Mattoon (1958) lists 36 sources. In 1959 it was selling in the United States at $2.75 for a 3-foot bush.

In "Gardening Illustrated" (1887) it is said that "This is an old greenhouse plant, well deserving cultivation although rather straggling in habit. Its shoots are clothed with opposite serrate leaves, and it bears axillary clusters of small purple or amethyst-coloured berries very freely. It may be propagated freely either by means of seeds or cuttings, and young plants, grown as recommended for Ardisias are best; old plants lose their bottom foliage, and become 'leggy' and unsightly." In 1892 the plants sold, in

pots, at chrysanthemum time for $5 apiece. Bush-Brown (1963) says that it "prefers rich circumneutral soil; fr[uits]...stay fresh for weeks and are attractive for arrangements in the home. In the north this bush is sometimes severely winter-killed; a drastic pruning in early spring is needed to restore its vigor."

Of particular interest are some amusing but on the whole justifiable (from the horticultural standpoint) remarks made by Masters (1871). He says, in part, concerning the genus Callicarpa, but with special reference to C. dichotoma: "See them when in leaf and they are not worth house-room; see them when in flower, and their room is, to use a popular saying, 'worth more than their company'; but see them when in fruit and every one cries out how beautiful!.....Two or three species have from time to time been introduced into our gardens, and some even were figured in botanical records, but generally with a sort of half-apology for occupying space with such mean-looking subjects. They were figured on botanical grounds -- for scientific purposes -- much in the same way that criminals are submitted to the faithful portraiture of the photographic camera, in order that they may be recognized in the future, and their worthlessness made apparent. Such was the case up till 1859, when all of a sudden a furore was excited by the exhibition in St. James Hall of a species of Callicarpa with purple berries, so beautiful that every spectator was loud in its praise. Dr. Lindley led the way in lavishing compliments on the plant, and as it would never do to let such a beauty go unnamed, he called it 'Callicarpa purpurea?' Very sagaciously he out a '?' after the name, knowing by experience that it is no easy matter to determine the species of Callicarpa."

Varacez (1913) comments that "Im Spätsommer schwellen die Kelche der zahlreichen Blumen und sind erst grün, färben sich jedoch etwa Ende September zu einem wunderbaren, auffallenden Lila, und sind glängend an der Oberfläche. In diesem Stadium erst hat C. purpurea ihren Höhepunkt erreicht und verbleibt so durch den ganzen Herbst und den halben Winter hindurch. Die Beeren anthalten weiszliches Fleisch und jede vier gesunde Samenkörner. Bei dieser Menge von Samen sollte man annehmen, die schöne Pflanze könnte mehr verbreitet sein. Dich welche 'geheimnisvolle Herkunft' hat diese Spezies!"

Van Melle (1942) notes that "Callicarpa dichotoma.....is a useful and decorative Japanese-Chinese shrub, grown mainly for the beauty of its small rounded clusters of lilac berries borne in autumn in the axils of the graceful, arching branches of the current season's growth. A unique and valuable effect, not duplicated by any other shrub. To about 4 ft. high, fairly hardy above New York City. If occasionally killed to the ground, it will develop and fruit in the same manner on new growth from the base." In his 1943 work, this same author elaborates as follows: "Callicarpa dichotoma.....and C. japonica.....are small shrubs, normally about 5 to 7 feet high, not perfectly -- i.e., not reliably -- hardy in our zone and likely to be killed back at least partly; a

matter which does not interfere greatly with their usefulness since they flower and fruit on growth of the current season and may be treated as die-backs. In that case they will grow little more than 3 to 4 feet high. Their one, but considerable, contribution to the border is the effect of their attractive, small, clustered, lilac berries strung along the branches, ripening in the Autumn and remaining effective for a long time. These are sufficient reason to endure their rather uninteresting foliage and insignificant small flowers. Of the two, C. japonica is the more erect-growing, with darker, long-tapering leaves to 6 inches long. C. dichotoma is of a more splashing habit and has smaller, shorter, light-green leaves. Both are unpretentious as to soil and succeed in sun or shade. They are worth planting in a small way for the sake of their pretty berries, which are among the most decorative of autumn effects."

Hottes (1942) says "The Beautyberries produce attractive leaves and the shrubs are quite graceful though upright. In planting them, give a rather protected place. Although the fruits are tiny, they are attractive upon the plant for garden effect. When the fruit is cut and placed in vases, it displays its true charm. Soil. Circumneutral pH 6.0—8.0.....Prune back the plants severely each Spring as the flowers and fruit are borne on new wood." As to methods of propagation he says "1. Cuttings of half-ripe wood are generally used. Give a little bottom heat and humid conditions. Some cover cuttings with a belljar. Protect in frames for Winter or bring into greenhouse. 2. Layers. 3. Seed sown indoors in Fall. 4. Hardwood cuttings would only be successful when they do not freeze."

The Tsui 601 collection, cited below, bears great resemblance to C. japonica Thunb. Pételot 3039 is also not typical — its leaves are large and the cymes long-pedunculate. F. C. Gates 16499 exhibits a fasciated branch. Hayek (1906), in speaking of C. elegans Hayek, says: "a C. purpurea Juss. foliis coriaceis nec chartaceis in acumen elongatum productis, nitidis, dentatis nec serratis, punctis glandulosis aureis nitidis nec purpureis diversa est."

Schauer (1847) cites Colebrook s.n. and Wallich 1828 from China, Loureiro s.n. from Cochinchina, and Zollinger 348 from Japan. Miquel (1865) cites Göring 348 from Japan. Maximowicz cites Ford s.n., Fortune 94, Hance s.n., and Shearer s.n. from China. Rehder (1916) cites the following: CHINA: Chekiang: D. MacGregor s.n. [Ningpo, 1908]; F. N. Meyer 425. Fukien: Dunn s.n. [Hongkong Herb. 3383]. Kwangtung: Hance 335. JAPAN: Honshiu: Herb. K. Sakurai s.n. [Omiya, June 18, 1911]; Maximowicz s.n. [Yokohama, 1862]. Kiushiu: Oldham 628.

P'ei (1932) cites the following: CHINA: Anhwei: Ching 2766; Ip s.n. Chekiang: Ching 3803; Hu 492 & 1634; Keng 472 & 916; D. MacGregor s.n.; F. N. Meyer 425. Honan: A. N. Steward 1714. Hunan:

Handel-Mazzetti 2691. Kiangsi: Chun 4279; Ip 119; A. N. Steward s.n.; Wang-te-Hui 235. Kiangsu: Hancock s.n.; Hers 2301; Ling 2489; A. N. Steward s.n.; Tso 815 & 1716. Kwangtung: Chun 5538; C. O. Levine s.n.; Mell 322; E. D. Merrill s.n.; Peng, Tak, & Kin 199 & 924; Tso 20407 & 21075. Kweichow: Handel-Mazzetti 2142. CHINESE COASTAL ISLANDS: Honam: C. Herb. 1197. Li (1963) cites A. Henry 435, but I regard this as C. formosana Rolfe.

Material of C. dichotoma has been misidentified and distributed in herbaria under the names C. americana L., C. japonica Thunb., and C. japonica var. taquetii Nakai. On the other hand, the Chun & Chien 5090, Herb. Canton Chr. Coll. 14649, Herb. Univ. Nanking 8065, and Tak & Chow 2788, distributed as C. dichotoma, are actually C. bodinieri Lévl.; C. H. Cheng 3080, R. C. Ching 1652 & 6394, M. L. Hancock s.n. [Herb. Univ. Nanking 12075], Herb. Univ. Nanking 7717 & 7794, Ling 1127 & 1243, E. D. Merrill 11298, and Peng, Tak, & Kin 678 [Herb. Canton Chr. Coll. 12677] are C. bodinieri var. giraldii (Hesse) Rehd.; Swartz s.n. [Jamaica] is the type collection of C. ferruginea Sw.; A. Henry 435 is C. formosana Rolfe; Chiao s.n. [Herb. Univ. Nanking 18896] is C. japonica Thunb.; Barchet 557, Cheng 578 & 3904, Chiao 1606, 1612, & 2916, R. C. Ching 5666, Hayakawa's collector A.4, Herb. Canton Chr. Coll. 12677, Herb. Univ. Nanking 7754, 18595, & 18601, Lau 4409, C. O. Levine s.n. [Herb. Canton Chr. Coll. 1751 & 3353], Ling 1189, E. D. Merrill 11112, A. N. Steward s.n. [Herb. Univ. Nanking 2426], Tsang 21346, and Tsui 450 are C. japonica var. angustata Rehd.; Chiao 2617 is C. japonica var. rhombifolia H. J. Lam; Ching 6394 is C. longifolia Lam.; Chong s.n. [Wan-Do, 29th October 1950] is the type collection of C. randaiensis var. koreana Moldenke; and C. Wright s.n. [Bonin Islands] is C. subpubescens Hook. & Arn.

According to C. E. Kobuski, in a letter to me dated April 2, 1962, the E. H. Wilson 8518 specimen from Dagelet Island, in the Arnold Arboretum herbarium, is Ligustrum foliosum f. ovale Nakai in the Oleaceae, but the United States National Herbarium specimen of the same number, from Ullung Island, is plainly C. dichotoma (although its label is inscribed "Lilium tigrinum"). Apparently there has been some serious mix-up in labeling involved here.

In all, 286 herbarium and fruit specimens and 11 mounted photographs have been examined by me.

Additional & emended citations: NORTH CAROLINA: Henderson Co.: Radford 4849 (Hi--48259). Martin Co.: Fox, Godfrey, & Boyce 4392 (N). INDIA: Uttar Pradesh: W. Griffith 335 (S). State undetermined: W. Griffith s.n. [Sumbhulpon] (S); Wallich 14 (S). CHINA: Anhwei: Ip s.n. [Herb. Univ. Nanking 5120] (Ca--232662). Chekiang: R. C. Ching 3803 (Ca--343263); Hu 1634 (Ca--362316); Keng 916 (Ca--361960); F. N. Meyer 425 (Ar--19785, Ca--218982, Du--11058). Honan:

A. N. Steward 1714 [Herb. Univ. Nanking 9842] (Ca--270559, W--1370062). Hunan: Fan & Li 353 (Bz--17568), 487 (Bz--17564). Kiangsi: Ip 119 [Herb. Univ. Nanking 7704] (Ca--258866); S. K. Lau 4521 (S, W--1753185); A. N. Steward s.n. [Herb. Univ. Nanking 2714] (Ca--230391, W--1279529); Tsiang 9882 (N). Kiangsu: H. T. Chang 344 (Du--250177); M. L. Hancock s.n. [Herb. Univ. Nanking 12074] (Ca--294848); K. Ling 2489 [Herb. Univ. Nanking 12440] (Ca--316401); A. N. Steward 2763 (Ph). Kwangsi: Ching 5201 (N); Steward & Cheo 930 (N, S); W. T. Tsang 22540 (S), 23862 (N), 24417 (N). Kwangtung: Herb. Bot. Mus. Stockholm s.n. [Canton] (S); S. K. Lau 20141 (Bz--17567, Ca--611459, N, N); Liou 1660 (N); Peng, Tak, & Kin 199 [Herb. Canton Chr. Coll. 12198] (Ca--274692, S, W--1247568), 924 [Herb. Canton Chr. Coll. 12923] (Ca--274410, S, W--1248134); Tso 20407 (N, N), 21075 (N, N); Tsui 395 (Ba, Bz--17565, N, W--1754642), 450 (N), 601, in part (Ba, Bi, Bz--17566, N), 666 (N, W--1754800). Shantung: Chiao 2787 (N, W--1596247), 2916 (N, N); Zimmermann 210 (Bz--17655), 465 (Bz--17654). Province undetermined: Fortune A.96 (K); Hu 492 (Ca--246815). CHINESE COASTAL ISLANDS: Honam: C. O. Levine s.n. [Herb. Canton Chr. Coll. 1197] (Ka--62899, W--1010299, W--1173183). INDOCHINA: Tonkin: Du Pasquier 3039 (Ca--344663, N); Pételot 1431 (Ca--227765, N, W--1717019), 3039 (Du--200930). KOREA: In-cho 1104 (Mi, Mi); In-cho's collector 9904 (Mi); R. K. Smith s.n. [August 1934] (Mi); E. H. Wilson 9348 (W--1052033). KOREAN COASTAL ISLANDS: Ullung: E. H. Wilson 8518, in part [Ullung Is.] (W--1054129). WESTERN PACIFIC ISLANDS: JAPAN: Honshiu: Charette 1896 (W--2247891); Collector undetermined s.n. [Musachi] (W--1133078), s.n. [Musashi, Oct. 22, 1893] (W--206184); Furuse s.n. [20 Oct. 1955] (S), s.n. [23 Oct. 1956] (S), s.n. [17 Aug. 1959] (S); Hiroe 12141 (Ca--82141); T. Koyama s.n. [Kadausa, 18 July 1954] (Ss), s.n. [Musashi, 3 August 1954] (Z); Y. Matsumura 1673 (N); Suzuki UC.8-105 [Herb. Suzuki 457010] (Ca--942079); Togasi 380 (B, Ca--955796, Go, Mg, Mi, N, Vi, W--2242154), s.n. [Hondo, Jul. 13, 1951] (S); E. H. Walker 5712 (W--2064953). Kiushiu: Herb. Mus. Bot. Stockholm s.n. [4/9/1913] (S). Island undetermined: Bridges s.n. (K); Herb. Lugd. Batav. s.n. [Japonia] (S); H. L. Jones s.n. [Japan, July 1] (Ob--14852); Masamune s.n. [Bizen, Oct. 10, 1925] (N). RYUKYU ISLAND ARCHIPELAGO: SAKISHIMA ISLANDS: Ikema: F. R. Fosberg 38552 (Sm). CULTIVATED: Algeria: R. Maire s.n. [Rouïlea, 7-6-1934] (Ca--595254, S). California: Newberry s.n. (F--45279); Walther s.n. [Golden Gate Park, Oct. 1930] (Gg--179083). District of Columbia: A. S. S. s.n. [Botanical Garden] (W--147602); Vasey s.n. [Agricultural Grounds] (W--56134); Ward s.n. [Agricultural Grounds] (W--245340). England: Hort. Veitch s.n. (Bm--fruit).

Florida: Fennell 641 [U. S. Pl. Introd. 102922] (Oa--9183), 704 [U. S. Pl. Introd. 102922] (Oa--9179). Germany: Herb. Hort. Berol. s.n. [1854] (B, S). India: Herb. Griffith 6043 (B); Herb. Hort. Bot. Calcutt. s.n. (B, Bz--17661, Ed, Ed, Mu--988, Mu--1161, V, X); Voigt s.n. [H. B. Seramp.] (Cp, Cp, Cp); Wallich 523 (Cp), 1828 (B, B, B, Ed), s.n. (Cp). Java: Herb. Hort. Bot. Bogor. XV. KA.XIV.6 (Bz--26431, Bz--26432, Bz, Bz, Bz, Bz, Bz). Kansas: F. C. Gates 14533 (Ka--71494, Um--821), 14548 (Ka--71506), 14963 (Bt-12678, E--1079876, Ka--71391, Ob--50626, Vi), 16499 (Ka--75813). Maryland: Coville s.n. [Garden of Whitman Cross, Chevy Chase, Oct. 29, 1926] (Ar--19787). Massachusetts: Blazic s.n. [July 21, 1922] (Gg--31979); Herb. Arnold Arb. 1088-2 (B), s.n. [Sept. 30, 1913] (Gg--31985); Kidder s.n. [21 Aug. 1925] (Oa--10746); Leavitt s.n. [Cambridge, Oct. 13, 1898] (Oa); E. J. Palmer s.n. [Herb. Arnold Arb. 10151; seed of E. H. Wilson 9348] (Ur); Rehder s.n. [1088-1] (Ur), s.n. [Arnold Arb., 10.IX.1898] (Ur), s.n. [Arnold Arb., 21. XI.1898] (Ur, Ur), s.n. [Sept. 28, 1915] (Ur), s.n. [Aug. 21] (B), s.n. [Oct. 31] (B), s.n. [Arnold Arboretum] (E--119313, Mi--photo); R. E. Torrey s.n. [Amherst, Sept. 12, 1942] (Ms); A. P. Wymans s. n. [July 23; Arn. Arb. 1088] (Io--34570), s.n. [Oct. 7; Arn. Arb. 1088] (Io--34569). Missouri: Cult. Mo. Bot. Gard. s.n. (E--119265); D. B. Dunn 12620 (Lb--39800); Flickinger s.n. [Webster Park] (E--801012); A. Koch s.n. [April 22] (E--119219); H. W. R. s.n. (E--119263); Shaw School of Botany s.n. (E--119294). New Jersey: H. N. Moldenke 2689 (N), 9315 (Ba, Br), 19138 (N, Or), 20130 (Sm). New York: K. R. Boynton s.n. [Bronx Park, July 8, 1924] (Ca--513050); W. W. Denslow s.n. [July 1864] (Ms), s.n. [Sept. 1865] (Ms); Quinn s.n. [6-10-38] (N); Tidestrom 4085 (Ar--19791). North Carolina: Biltmore Herb. 4189 [August 2nd, 1897; Herb. Umbach 4506] (Al, B, B, Ca--513050, E--119264, E--702009, Ur, Vt, Vt, W--332096, We), 4189 [September 20th, 1897; Herb. Umbach 4506] (Al, B, Ur, Vt, Vt, We); Le Clair s.n. [Chapel Hill, Nov. 17, 1938] (Hi--3467); Lindley s.n. [Greensboro, Oct. 1931] (Hi--59417); A. C. Mathews s.n. [Chapel Hill, October 5, 1938] (Hi--10083); Packard & Harrison s.n. [Biltmore Estate, Sept. 13, 1899] (Ar--19790), s.n. [Sept. 20, 1899] (Io--29668); P. O. Schallert s.n. [Winston-Salem, 7/25/26] (Vt), s.n. [7/10/27] (Ew), s.n. [Winston-Salem, 6/20/34] (V). Ohio: Rob. Burton s.n. [October 1946] (Ws). Pennsylvania: MacElwee s.n. [West Philadelphia] (D--514126); Martindale s.n. [Meehan's Nurseries, July 1876] (Pr); Porter s.n. [Lafayette College, Easton] (F--317329); W. H. Rhoades s.n. [North Wales, August 1934] (Bt--29653, Bt--44906, Hs); Westerfeld 2502 (We). Russia: Virchou s.n. [Batoum, 10 Oct. 1811] (B). Virginia: Towne s.n. [October 1895] (No--25644). LOCALITY OF COLLECTION UN-

DETERMINED: Muenscher & Burkholder s.n. (Ca—513049).

CALLICARPA DICHOTOMA f. ALBIFRUCTA Moldenke, Phytologia 7: 429. 1961.

Bibliography: Moldenke, Phytologia 7: 429. 1961; Moldenke, Biol. Abstr. 36: 4036. 1961; Moldenke, Résumé Suppl. 3: 27. 1962; Hocking, Excerpt. Bot. A.5: 44. 1962.

This form differs from the typical form of the species in having white fruits.

The type of the form was collected by M. Togasi (no. 1667) from plants in cultivation at Settsu, Yamamoto, Honshiu, Japan, on September 21, 1957, and is deposited in the herbarium of the Naturhistoriska Riksmuseum at Stockholm. In all, 3 herbarium specimens, including the type, have been examined by me.

Citations: CULTIVATED: Japan: Togasi 1667 (N—isotype, S—type, W—2335139—isotype).

CALLICARPA DICHOTOMA var. SINUATO-DENTATA Dop, Bull. Soc. Hist. Nat. Toulouse 64: 507. 1932.

Bibliography: P. Dop, Bull. Soc. Hist. Nat. Toulouse 64: 507. 1932; Moldenke, Known Geogr. Distrib. Verbenac., ed. 1, 59 & 86 (1942) and ed. 2, 135 & 177. 1949; Moldenke, Résumé 175 & 443. 1959.

This variety differs from the typical form of the species in having its leaf-blades acuminate-caudate and simuate-dentate along the margins of the upper half.

The type of the variety was collected by Benedict Balansa (no. 926) at Ouonbi, Tonkin, Indochina. Dop (1932) says: "En l'absence de fleurs je fais de cette plante une simple variété. Une connaissance plus complète de ses caractères permettra peutêtre de l'élever au rang d'espèce". I know nothing of this taxon besides what is stated in the original description.

CALLICARPA DOLICHOPHYLLA Merr., Philip. Journ. Sci. Bot. 7: 339—340. 1912.

Synonymy: Callicarpa caudata var. glabriuscula H. J. Lam, Verbenac. Malay. Arch. 61. 1919.

Bibliography: Schau. in A. DC., Prodr. 11: 645. 1847; E. D. Merr., Philip. Journ. Sci. Bot. 7: 339—340 (1912) and 12: 108 & 301. 1917; H. J. Lam, Verbenac. Malay. Arch. 47, 50, 61, & 82. 1919; Prain, Ind. Kew. Suppl. 5: 43. 1921; Bakh., Bull. Jard. Bot. Buitenz., ser. 3, 3: 26. 1921; E. D. Merr., Enum. Philip. Flow. Pl. 3: 384. 1923; Moldenke in Fedde, Repert. Spec. Nov. 40: 98. 1936; Moldenke, Prelim. Alph. List Invalid Names 10 & 11. 1940; Moldenke, Alph. List Invalid Names 8 & 10. 1942; Moldenke, Known Geogr. Distrib. Verbenac., ed. 1, 62 & 82 (1942) and ed. 2, 140 & 177. 1949; Moldenke, Résumé 182, 242, & 443. 1959; Moldenke, Phytologia 14: 142. 1966.

Shrub, 2 m. tall, or small tree, entirely glabrous or the younger parts more or less pubescent with simple (not stellate) hairs, a few hairs sometimes persistent on the leaves, especially beneath;

stems 2—3 cm. in diameter; branches terete or somewhat compressed, brown, smooth, glabrous or somewhat pubescent when young; branchlets somewhat hairy with simple hairs or subglabrous; leaves decussate-opposite; petioles 0.5—2.5 cm. long; leaf-blades chartaceous, lanceolate, 12—30 cm. long, 2.5—7 cm. wide, acuminate or rather slenderly acuminate at the apex, subentire or crenate- to crenulate-denticulate along the margins, acute or acuminate at the base, sometimes puberulent or pubescent with simple hairs on both surfaces when immature, the lower surface more densely hairy and glandular, mostly entirely glabrous or subglabrous on one or both surfaces when mature, the lower surface distinctly yellow-glandular, the glands in minute pits; secondaries 13—16, distinct, curved-ascending, anastomosing, the reticulation subparallel; cymes axillary, solitary, lax, 3.5—6 cm. long, 4—6.5 cm. wide, often as wide as long, somewhat pubescent with simple hairs; peduncles about 1.5 cm. long, usually longer than the petioles; calyx cupuliform or somewhat infundibular, 1—1.5 mm. long, glabrous, its rim 4-denticulate, the teeth short, obscure; corolla somewhat exserted, violet or reddish, 2.5—3 mm. long, glabrous, its tube somewhat ampliate upwards; stamens exserted; anthers 0.6 mm. long; immature fruit globose, small, white when mature, containing 4 pyrenes.

The type of this species was collected by Hugh Cuming (no. 1330) at Cagayan, Luzon, Philippine Islands, and was deposited in the herbarium of the Philippine Bureau of Science at Manila, but is now destroyed. Lam's C. caudata var. glabriuscula was based on the same collection, and this collection was cited by Schauer (1847) as C. longifolia α subglabrata, along with six other collections from India, Java, and Japan. This fact has led some authors to regard Schauer's trinomial to belong, in part, at least, in the synonymy of C. dolichophylla. However, since Schauer plainly proposed his name merely as a designation for the typical form of C. longifolia Lam., I feel that it should be placed only in the synonymy of that species. His citation of Cuming's plant was only a misidentification on his part.

Merrill (1912) cites, in addition, a Ramos s.n. [Herb. Philip. Bur. Sci. 8268] from Luzon, in the Philippine Bureau of Science Herbarium, now destroyed. He comments that Schauer's description of C. longifolia α subglabrata "does not apply particularly well to the Philippine plant, which to me does not appear to be very closely allied to Lamarck's species. It is well characterized by lax cymes and its entirely glabrous vegetative parts, or if pubescent at all, then with simple, not stellate hairs, in this last character differing from most, if not all, other species of the genus. Two specimens of Cuming's No. 1330 are in the Herbarium of the Bureau of Science, one with rather narrow, somewhat pubescent leaves, and with pubescent stems and inflorescence, quite manifestly a young stage of the plant, the other with larger, glabrous leaves and inflorescence; this latter I have made the type sheet."

Some specimens of C. longissima (Hemsl.) Merr. greatly resemble

the M. Ramos 2037 collection cited below, and the two species are certainly closely related. Lam (1919) says of C. dolichophylla: "It has the habit of C. longifolia, but is essentially different by its simple hairs" and "folia quam in var. β [=C. caudata Maxim.] angustiora". Bakhuizen van den Brink (1921) placed it in the synonymy of C. longifolia Lam. with a question. Merrill (1923) comments that "This is remote from Callicarpa longifolia Lam., where Bakhuizen has erroneously placed it as a synonym."

The species has been found growing in open places and damp soil on the borders of forests, at 2000 feet altitude, flowering and fruiting in March. The flowers are described as "violet" on Herb. Philip. Bur. Sci. 46779. Material has been misidentified and distributed in herbaria under the names C. longifolia Lam., C. longifolia var. subglabra Schau., C. longifolia var. subglabrata Schau., and C. pentandra var. typica f. genuina Bakh.

In all, 9 herbarium specimens, including type material of both names involved, and one mounted photograph have been examined by me.

Citations: WESTERN PACIFIC ISLANDS: PHILIPPINE ISLANDS: Luzon: Cuming 1330 (M—isotype, V—isotype, Z—photo of isotype); M. Ramos 2037 (Bz—18533, N), s.n. [Herb. Philip. Bur. Sci. 1063] (N); Ramos & Edaño s.n. [Herb. Philip. Bur. Sci. 46779] (B, Bz—17570, Ca—309301, N).

CALLICARPA ELEGANS Hayek in Fedde, Repert. Spec. Nov. 2: 88. 1906.

Synonymy: Callicarpa serrulata Zipp. ex H. J. Lam, Verbenac. Malay. Arch. 83, in syn. 1919.

Bibliography: Hayek in Fedde, Repert. Spec. Nov. 2: 88. 1906; E. D. Merr., Philip. Journ. Sci. Bot. 7: 338. 1912; Prain, Ind. Kew. Suppl. 4: 34. 1913; Fedde, Repert. Spec. Nov. Gesamtverz. 58. 1914; H. J. Lam, Verbenac. Malay. Arch. 50, 73, & 83—84. 1919; Bakh., Bull. Jard. Bot. Buitenz., ser. 3, 3: 25 & 26. 1921; E. D. Merr., Enum. Philip. Flow. Pl. 3: 384. 1923; H. J. Lam in Engl., Bot. Jahrb. 59: 25. 1924; Kanehira, Fl. Micron. 456. 1933; Moldenke, Alph. List Common Vern. Names 29, 62, 63, & 86. 1939; Moldenke, Phytologia 2: 94. 1945; Moldenke, Alph. List Invalid Names Suppl. 1: 3. 1947; Moldenke, Alph. List Cit. 2: 602 (1948) and 4: 1259. 1949; Moldenke, Known Geogr. Distrib. Verbenac., ed. 2, 140, 142, & 177. 1949; Moldenke, Phytologia 3: 140 (1949) and 4: 77. 1952; Moldenke, Résumé 182, 185, 186, 242, & 443. 1959; Moldenke, Résumé Suppl. 3: 21—23. 1962; Moldenke, Phytologia 14: 112, 117, 141, 162, 163, & 166. 1966.

Slender bush or very lax shrub, 1—3 m. tall, or a shrubby climbing vine; stem to 1.6 cm. in diameter; wood soft, sappy, white, odorless, tasteless; bark smooth, grayish-white; branches arising from below the middle, slender, lax, subtetragonal, floccose-tomentose or with sparse stellate hairs when young, glabrous in age, eglandular, re-branched; leaves decussate-opposite, very short-petiolate, nearly flat, chiefly horizontal; petioles 3—10

mm. long; leaf-blades chartaceous (or coriaceous, according to Hayek and Elmer), lanceolate, 4.5—14 cm. long, 1—4.5 cm. wide, shiny bright-green above, duller and paler beneath, acuminate at the apex or attenuate into a long linear acute apex, regularly serrate or serrulate along the margins except near the base, attenuate into the petiole at the base, glabrous on both surfaces, sparsely glandulose above with shiny golden glands, more densely so beneath, with some stellate hairs on the midrib and some larger glands near it; secondaries 4—6 pairs; inflorescence axillary; cymes few-flowered, slender, loose, 1—3 cm. long and wide, 1/3—1/2 as long as the subtending leaves, nearly glabrous; peduncles dark purplish-blue, 0.5—1.5 cm. long, almost twice as long as the subtending petioles, sparsely tomentose with deciduous hairs; pedicels dark purplish-blue, sparsely tomentose with deciduous hairs; flowers odorless; calyx with more of a greenish tinge in the blue, 1—1.5 mm. long, glabrous, somewhat glandular, its rim truncate or hardly 4-denticulate; corolla blue, bluish-yellow, or violet-blue to rose, purple, or pinkish-white, its tube 1.5 mm. long, the lobes 1.5 mm. long, somewhat glandulose; stamens 5 mm. long; filaments blue; anthers yellow or deep-yellow, glandulose on both sides; style whitish, 4 mm. long; stigma greenish; ovary glandulose; fruit green when immature, blue to purple or violet when ripe, globose, about 3—6 mm. wide, hanging, very pretty, somewhat depressed above, glabrous, eglandular, subtended by the persistent green fruiting-calyx.

The type of this species was collected by Hugh Cuming (no. 1460) in the province of Camarines Sur, Luzon, Philippine Islands. Hayek, in his original description (1906) says: "Foliorum forma Callicarpae caudatae Maxim. simillima, differt foliorum glabritie et serratura maiore nec non indumento ramorum diversa; a C. purea Juss. foliis coriaceis nec chartaceis in acumen elongatum productis nitidis. dentatis nec serratis [yet in his diagnosis he says "margine regulariter serrata"], punctis glandulosis aureis nitidis nec purpureis diversa est." This is the first reference that I can recall to any "purple glands" on the leaves of C. dichotoma (Lour.) K. Koch! Kanehira (1933) misspells Hayek's surname "Heyek". Mrs. Clemens says of her no. 16800 "probably a shade form of C. formosana; note droop of inflorescence". Bakhuizen van den Brink (1921) places C. elegans, C. serrulata, C. longifolia var. brevipes Benth., and C. brevipes (Benth.) Hance in the synonymy of what he calls C. japonica var. dichotoma [=C. dichotoma (Lour.) K. Koch]. In my 1936 work and my other papers previous to the present one I also placed C. serrulata Zipp. there, but this seems to be incorrect. The reference sometimes given to Just, Bot. Jahresber. 33: 88 (1905) appears to be erroneous.

Callicarpa elegans has been found growing in coral reef forests, thickets near the sea, open forests on slopes, and forests on the summit of hills, on dry forested slopes, in stony-gravelly soil of

riverbeds, and near rivers, at altitudes of 10 to 665 meters, flowering in February, April, May, July, August, and December, and fruiting in February, April, May, September, October, and December. Vernacular names recorded for it are "gárnei", "gerrucóu", "gerucáu", "gorruau", "haruei", and "tambalabási".

The flowers are described as "pinkish-white" on Williams 340, "bluish-yellow" on Herb. Philip. Bur. Sci. 49011, "blue" on Elmer 12144, "violet-blue" on Herb. Philip. Bur. Sci. 43103, and "purple" on Takamatsu 1218.

Lam (1924) says "die Blätter werden zusammen mit Betel gekaut" in the Palau Islands. In his 1919 work he comments that "Its affinity is with C. purpurea. Points of difference are the acuminate apex of the leaves, which is never abrupt, and always serrulate, upper side without any hairs and with some glands, and corolla-lobes as long as the tube". In this work he cites a Ramos s.n. [Abra, Luzon, Feb. 1909] (Le--911.135-278), while in his 1924 work he cites Ledermann 14358 from Babelthuap and Ledermann 14065, 14201, & 14257a and Raymundus 129 from Koror. Under what he calls C. cana var. latifolia H. J. Lam [=C. candicans (Burm. f.) Hochr.] he cites a Volkens 439 from Yap with a question and a note "cf. C. elegans".

Takamatsu 1218 does not appear to be typical; the collector describes it as an abundant shrub in dry fields.

Merrill (1912) says: "The species appears to be quite widely distributed in the northern Philippines". He cites, in addition, Curran s.n. [Herb. Philip. Forest. Bur. 7013], Hallier s.n., Merritt & Darling s.n. [Herb. Philip. Forest. Bur. 13994], and M. Ramos s.n. [Herb. Philip. Bur. Sci. 4815] from Luzon, and Merritt s.n. [Herb. Philip. Forest. Bur. 6725] from Mindoro.

Material has been misidentified and distributed in herbaria under the names C. cana var. glabriuscula Lam., C. formosana Rolfe, and C. paucinervia Merr.

In all, 48 herbarium specimens and 2 mounted photographs, including material of the type collection, have been examined by me.

Citations: WESTERN PACIFIC ISLANDS: PHILIPPINE ISLANDS: Bohol: M. Ramos s.n. [Herb. Philip. Bur. Sci. 43103] (Ca--242444), s.n. [Herb. Philip. Bur. Sci. 43186] (Ca--242445). Leyte: Edaño s.n. [Herb. Philip. Bur. Sci. 41674] (Bz--17658, Ca--239174). Luzon: M. S. Clemens 16800 (Ca--285341), 17073 (Ca--285316); Cuming 1460 (N--isotype); Edaño s.n. [Herb. Philip. Bur. Sci. 48817] (Ca--321236); Haenke 73 (Ca--280929); Loher 14887 (Ca--243059), s.n. [Montalban, May 1915] (Ca--229197); Otanes s.n. [Herb. Philip. Bur. Sci. 17851] (Bi); M. Ramos s.n. [Herb. Philip. Bur. Sci. 7054] (N), s.n. [Herb. Philip. Bur. Sci. 33146] (Ca--216187); R. S. Williams 340 (N). Mindanao: Ramos & Edaño s.n. [Herb. Philip. Bur. Sci. 49011] (Ca--324035). Panay: Edaño s.n. [Herb. Philip. Bur. Sci. 42365] (Ut--6305a). Sibuyan: Elmer 12144 (Bi, Bz--

17659, Mi--photo, N, Ut--28763, V, Vi, Vt, Z--photo). MARIANA ISLANDS: Rota: Kanehira 1758 (N). Saipan: Kanehira 1026 (N), 2246 (N). Island undetermined: Haenke 798 (N). PALAU ISLANDS: Babelthuap: Takamatsu 1218 (Bi, Ca--995254). Koror: Herre 53 (Bi, N), 66 (Bi, N). Makarakol: Hosokawa 9273 (Bi, Mi). Todaiyama: Kanehira 1886 (N). Yap: Kanehira 1204 (Bi, N). Island undetermined: Hosokawa 7195 (Bi); Tuyama s.n. [29 Aug. 1937] (Bi). MICRONESIA: CAROLINE ISLANDS: Auluptagel: Hosokawa 7454 (Bi, Mi). Corol: Kanehira 248 (Bi, N), 249 (N), 1995 (N), 2412 (N).

CALLICARPA ERIOCLONA Schau. in A. DC., Prodr. 11: 643. 1847.

Synonymy: Callicarpa cana var. repanda Warb. in Engl., Bot. Jahrb. 13: 426. 1891. Callicarpa repanda (Warb.) K. Schum. & Warb., Notizbl. Bot. Gart. Berlin 2: 144. 1898. Callicarpa repanda K. Schum. & Warb. apud Thiselt.-Dyer, Ind. Kew. Suppl. 2: 32. 1904. Callicarpa erioclona var. repanda (Warb.) H. J. Lam, Verbenac. Malay. Arch. 78. 1919. Callicarpa erioclona var. typica H. J. Lam, Verbenac. Malay. Arch. 77. 1919. Callicarpa fumata Zipp. ex H. J. Lam, Verbenac. Malay. Arch. 77, in syn. 1919. Callicarpa erioclona var. typica f. typica Bakh., Bull. Jard. Bot. Buitenz., ser. 3, 3: 19. 1921. Callicarpa candida Elm. ex E. D. Merr., Enum. Philip. Flow. Pl. 3: 384, hyponym. 1923. Callicarpa erioclona var. repanda H. J. Lam in Lauterb., Engl. Bot. Jahrb. 59: 89. 1924. Calicarpa erioclona Schau. ex Moldenke, Alph. List Invalid Names Suppl. 1: 3, in syn. 1947. Verbena erioclona Schau. ex Moldenke, Résumé Suppl. 3: 37, in syn. 1962. Callicarpa lagunensis Merr. ex Moldenke, Résumé Suppl. 4: 11, in syn. 1962. Callicarpa erioclona var. typica f. gemina Bakh., in herb.

Bibliography: Schau. in A. DC., Prodr. 11: 643. 1847; Miq., Fl. Ind. Bat. 2: 889. 1856; Benth. & Muell., Fl. Austral. 5: 57. 1870; Scheffer, Ann. Jard. Bot. Buitenz. 1: 41. 1876; Vidal, Revis. Pl. Vasc. Filip. 208. 1886; Warb. in Engl., Bot. Jahrb. 13: 426. 1891; Jacks. in Hook. f. & Jacks., Ind. Kew. 1: 386. 1893; K. Schum. & Warb. in K. Schum., Notizbl. Bot. Gart. Berlin 2: 144. 1898; K. Schum. & Lauterb., Fl. Deutsch. Schutzgeb. Südsee 522. 1900; Thiselt.-Dyer, Ind. Kew. Suppl. 2: 32. 1904; E. D. Merr., Philip. Journ. Sci. Bot. 1, Suppl. 1: 121. 1906; Elm., Leafl. Philip. Bot. 3: 866. 1910; E. D. Merr., Philip. Journ. Sci. Bot. 9: 134 & 135. 1914; H. J. Lam, Verbenac. Malay. Arch. 49, 71, 76--78, & [361]. 1919; Bakh., Bull. Jard. Bot. Buitenz., ser. 3, 3: 10 & 18--20. 1921; E. D. Merr., Enum. Philip. Flow. Pl. 3: 384. 1923; E. D. Merr., Journ. Malay. Br. Roy. Asiat. Soc. 1: 32. 1923; H. J. Lam in Lauterb., Engl. Bot. Jahrb. 59: 89. 1924; Bakh. in Bakh. & Lam, Nov. Guinea 14, Bot. 1: 167. 1924; P. Dop, Bull. Soc. Hist. Nat. Toulouse 64: 500, 502, 511, & 512. 1932; Moldenke in Fedde, Repert. Spec. Nov. 40: 112. 1936; Moldenke, Alph. List Common Vern. Names 17, 23, 26, & 29--31. 1939; Moldenke, Prelim. Alph. List Invalid

Names 10 & 12. 1940; Moldenke, Known Geogr. Distrib. Verbenac., ed. 1, 59, 62, 64, 65, 67, 68, & 86. 1942; Moldenke, Alph. List Invalid Names 8--10. 1942; Moldenke, Phytologia 2: 94. 1945; Moldenke, Alph. List Cit. 1: 4, 224, & 225 (1946), 2: 403, 404, 463, & 556 (1948), 3: 969 (1949), and 4: 1115, 1158, 1161, 1226, & 1259. 1949; Moldenke, Known Geogr. Distrib. Verbenac., ed. 2, 135, 140, 144--146, 148, 150, & 177. 1949; Moldenke, Revist. Sudam. Bot. 8: 172. 1950; Moldenke, Phytologia 3: 293--296 & 380 (1950) and 4: 78, 87, & 121--123. 1952; Moldenke, Inform. Mold. Set 51 Spec. 2. 1956; Moldenke, Résumé 155, 175, 177, 182, 185, 186, 189, 191--194, 200, 203, 240, 242, 243, 246, 247, 427, & 443. 1959; Moldenke, Résumé Suppl. 1: 12. 1959; Moldenke, Phytologia 8: 57 (1961) and 8: 176 & 385. 1962; Hocking, Excerpt. Bot. A.5: 45. 1962; Moldenke, Biol. Abstr. 37: 1062. 1962; Moldenke, Résumé Suppl. 3: 21--23 & 30 (1962), 4: 8, 9, & 11 (1962), 12: 8 (1965), and 14: 7. 1966; Moldenke, Phytologia 13: 502 (1966) and 14: 37, 48, 107, 111, 113, 114, 117--120, & 122. 1966.

Lax and straggling or tall shrub, 1--10 m. tall, or small tree 3 m. tall, erect or semi-climbing; stems 1.5--6 cm. in diameter, loosely branched from below the middle; wood rather hard, "pale-white", odorless, tasteless; bark yellowish, especially beneath the smoothish epidermis; branchlets very hirsute, ferruginous-plumose, or lanate-tomentose and also white-farinose; leaves decussate-opposite, horizontally spreading, slightly recurved; petioles 1--3.5 cm. long, 4 mm. thick, canaliculate, very hirsute-tomentose with ferruginous-plumose hairs and also white-farinose; leaf-blades submembranous or membranous to subchartaceous, diverse in size, deep- or dark-green above, glaucous or yellowish-glaucescent to gray-brown beneath, lanceolate, oblong-lanceolate, or broadly lanceolate to elliptic-oblong, obovate-oblong, obovate, or broadly ovate, 9--26 cm. long, 3.5--14 cm. wide, acuminate or subabruptly acuminate at the apex, denticulate (except at the base) or shortly and unequally dentate along the margins, sometimes irregularly so, acuminate or subabruptly acuminate to cuneate or obtuse at the base, the upper surface stellate-hairy when immature, smooth and glabrous when mature, reticulate-rugulose, the lower surface very densely stellate-tomentose with white and very short farinose hairs, often ashy with fine brown hairs (brownish-plumose) on the midrib and secondaries beneath; secondaries 7--15 per side; cymes crowded, many-flowered, hemispheric-corymbose, 2.5--5 cm. long, 2.5--9 cm. wide, usually small, sometimes larger, very hirsute and ferruginous-plumose; peduncles 0.7--2 cm. long, usually subequaling or shorter than the subtending petiole, sometimes longer, lanate-tomentose with ferruginous hairs and also white-farinose; pedicels very short, stellate-tomentose; flowers odorless; calyx exiguous, 1--1.3 mm. long, shorter than the corolla, white-stellate-tomentose and -plumose or densely woolly-villous on the outside, glandular, its rim 4-toothed, the teeth very short; corolla white, dusty-white, or whitish-brown to yellowish-brown, pink, rose-colored, rose-magenta, red, violet, purple, or blue, glabrous, its tube 1.6 mm. long, the lobes 0.4 mm. long, with lines of yellow glands; stamens 3 mm.

long, long-exserted; anthers yellow-brown, densely glandulose; pistil long-exserted; style 4 mm. long; stigma somewhat incrassate; ovary villous, glandulose; young infructescence erect, green; fruit small, globose, green when immature, blue or dark-blue to blue-black, pink, red, blood-red, violet, purple, or black when ripe, sometimes white [Gjellerup 698].

The type of this interesting species was collected by Hugh Cuming (no. 911) in Albay province, Luzon, Philippine Islands, with specimens of the type collection cited by Schauer (1847) in the Berlin, Kunth, and Lucae herbaria. The type of C. candida was collected by Adolph Daniel Edward Elmer (no. 15124) at Irosin, Mount Bulusan, in the province of Sorsogon, Luzon, in November, 1915. The type of C. lagunensis was gathered by Maximo Ramos [Herb. Philip. Bur. Sci. 23798] at San Antonio, in the province of Laguna, Luzon, in October, 1915, and is deposited in the United States National Herbarium at Washington. It exhibits large coarsely toothed leaves and spreading-villous stems.

Callicarpa erioclona has been found by collectors growing along streams and forest streams, along the ocean strand, on wooded ridges bordering creeks, coral limestone seacliffs, streambanks, rocky or dry forested slopes, and the slopes of dry hills, at the edges of cliffs, in dry fertile soil, rainforests and dense rainforests, new and secondary forests, forested valleys, banana plantations, woods and forests, open forests, and open wet areas, at altitudes of 10 to 416 meters, but chiefly at low altitudes, flowering from March to December, and fruiting from April to December.

Herre describes it as "common everywhere" in the Palau Islands; Takamatsu calls it "common in dry places in open forests" on Yap. Pancho found it "in open waste places throughout the Philippines", and Glassman calls it "common" on Lele islet. Smitinand describes it as "common in evergreen jungles" and "common along edge of thicket near village" in Thailand, but Kanehira & Hatusima aver that it is "rare" in New Guinea. Vernacular names recorded for it are "alo-loy", "a tiptipinagut", "a-tiptipinagut", "balá-balának", "cagong", "dup", "ikabag", "kagong", "palis", "phlu yuan", "salingárau", "tambalabási", "tigao", "tígau", "tigoo", and "túbang-dalág". Of these I do not know which is the more generally employed.

The flowers are described as "red" on Janowsky 545, "pink" on Kostermans 2681, "violet" on Herb. Philip. Forest. Bur. 30005, "rose-colored" on Zwickey 14, "rose-magenta" on H. St. John 21502, "blue" on Herb. Philip. Bur. Sci. 46162, "yellowish-brown" on Herb. Philip. Bur. Sci. 49282, "whitish-brown" on Herb. Philip. Bur. Sci. 49314, "purple" on Glassman 2710 and Smitinand 1451, "dusty-white" on Castro & Melegrito 1714, and "white" on Agama 1049, Gjellerup 698, Guerrero 7, Hallier 4027a, Pancho 1385, Peekel 63, and Vanoverbergh 17598.

Miquel (1856) notes "Tomento dimorpho insignis". Bakhuizen van

den Brink (1921) elaborates this as follows: "Young parts, lower side of leaves and inflorescence with dense hairs of two sorts, viz. partly very densely with a white appressed tomentum, partly long brownish-plumose". Pancho, St. John, and Zwickey refer to the fruits as "berries", but they are drupes.

Guerrero reports that this plant is medicinal, and that on Mindanao the leaves are used for curing stomach-ache by applying them externally as a plaster. Zwickey reports the fruit edible and that the leaves, mixed with coconut oil, are used as an application on wounds. Fox tells us that the pounded leaves are mixed with pounded fruit of red pepper and the stems of "biga" and employed as a fish-poison on Palawan; Wenzel also reports the leaves used to stupify fish on Leyte and Mindanao. On Luzon, according to Ramirez, the leaves are pounded to a powder in a mortar, mixed with ashes, and then strewn on the water of streams. The leaves are employed as a fish-poison also on the Palau Islands according to Kanehira, while on Ponape, according to Burton, this is their finest available fish-poison, somewhat like Derris in its action. Lam (1924) says "die zerissenen Blätter werden zum Betäuben von Fischen angewendet."

This same author, in his 1919 work, cites Peekel 734 from New Ireland under what he calls C. cana var. typica H. J. Lam with a note "(cf. C. erioclona var. γ)", this variety being var. repanda. He distinguishes his varieties of C. erioclona as follows:

Var. typica H. J. Lam -- "folia membranacea vel subchartacea lanceolata vel late lanceolata, utrinque acuminata, margine praeter basin, interdum irregulariter, denticulata; nervis secundariis utrinque 7—12; 9—26 cM. longa, 3 1/2 — 9 1/2 cM. lata; petiolo 1—2 1/2 cM. longo; cymi 2 1/2 — 4 cM. longi, 2 1/2 — 4 cM. lati, pedunculo 0.7—1.5 cM. longo, interdum quam petiolo longiore." He cites Forsten s.n. (Le—908.266-1221) from Celebes; Celestino 7337, "Com. d. l. fl. for. d. Fil. no. 843", Cuming 911, and Elmer 11190 from the Philippine Islands, Gjellerup 698 from Dutch New Guinea, and Parkinson 191 from New Britain.

Var. latifolia H. J. Lam — "folia chartacea, ovata vel oblongo-ovata, basi cuneata, plerumque subrotundata, abrupte attenuata, apice acuminata, margine, praeter basin, grosse dentata, dentibus simbus produndis, nervis utrinque 8, 7—17 cM. longa, 4 1/2 — 11 1/2 cM. lata, petiolo 0.7—3.2 cM. longo." Here he cites DeVriese s.n. (Le—908.267-1091, Le—908.267-1092), "Herb. var. botan." s. n. (Le—908.265-1104, Le—908.265-1110, Le—908.265-1446), and Forbes 1355 from Java. I regard this taxon to be C. inaequalis Teijsm. & Binn., which see.

Var. repanda (Warb.) H. J. Lam -- "folia subchartacea, vel membranacea, late ovata, basi apiceque subabrupte acuminata, margine denticulata, nervis utrinque 10, 22—26 cM. longa, 12—13 cM. lata, petiolo 2—3 1/2 cM. longo, crasso (0.4 cM.); cymi majores 5 cM. longi, 9 cM. lati, pedunculo 1 1/2 — 2 cm. long." Here he cites Dahl s.n. from New Britain and Peekel 63 from New Ireland.

He comments that "The species is well characterized by its often plumose tomentum, and especially by the form of the leaves and the often denticulate or dentate margins. Its affinity is with C. cana and C. paucinervia." He gives its general distribution as Java, Celebes, Philippine Islands, New Guinea, New Britain, and New Ireland.

Bakhuizen van den Brink (1921) proposes C. erioclona var. typica f. rivularis (Merr.) Bakh. and C. erioclona var. subalbida (Elm.) Bakh., but I regard both these taxa as distinct species, C. rivularis Merr. and C. subalbida Elm., which see. The "New Britain" reference given by this same author under C. bicolor A. L. Juss. doubtless refers to C. erioclona instead. It is interesting to note in this connection that Bentham & Mueller (1870) say "C. bicolor Juss.....and C. erioclona Schau.....appear to me both to be precisely the common Archipelago form of C. Cana" [=C. candicans (Burm. f.) Hochr.].

It is also worth noting here that the original citations for C. repanda is often given as "K. Schum. et Warb., Fl. Neu-Pomm. 144", as, for instance, by Lam (1919). Bakhuizen van den Brink (1921) cites the original publication of C. cana var. repanda as "1890" instead of 1891 and the Warburg (1891) reference in the bibliography above as "1890", while Kanehira & Hatusima (1942) cite Lauterb., Engl. Bot. Jahrb. 59: 89 as "1925" instead of 1924.

Schauer (1847) and Miquel (1856) cite a Lesson s.n. from New Guinea, not as yet seen by me; Vidal (1886) cites his nos. 494 from Bataan and 843 from Camarines Sur, Luzon; and Lam (1924) notes that the branches on Peekel 63, from New Ireland, are "braun- oder schwarz-filzig". He (1924) and Kanehire & Hatusima (1942) give the general distribution of the species as Java, Celebes, New Guinea, and the Bismark Archipelago. Bakhuizen (1924) gives it as the Philippines, Celebes, New Guinea, New Britain, and New Ireland.

The Stockholm specimen of Herb. Philip. Bur. Sci. 30258 has been cited as C. candicans, but the University of California specimen of the same number is most definitely C. erioclona!

Material has been misidentified and distributed in herbaria under the names C. bicolor A. L. Juss., C. cana L., C. candicans (Burm. f.) Hochr., and C. tomentosa Lam. On the other hand, the Glassman 2710, Kanehira 1006, 1242, & 1301, P. Nelson 531, and Takamatsu 1824, distributed as C. erioclona, are actually var. paucinervia (Merr.) Moldenke, while M. S. Clemens 16799, Haenke 81, Loher 12347, Pierre 5227, and Ramos & Edaño s.n. [Herb. Philip. Bur. Sci. 47121] are C. plumosa Quisumb. & Merr.

In all, 155 herbarium specimens, including type material of most of the names involved, and one mounted photograph have been examined by me.

Citations: THAILAND: Smitinand 1355 [Herb. Roy. Forest. Dept.

7311] (Ss), 1451 [Herb. Roy. Forest. Dept. 7799] (Z). INDOCHINA: Annam: Pierre s.n. [9/1865] (N). Cambodia: Bejaud 447 (N). Cochinchina: Pierre s.n. [9/1865] (B). WESTERN PACIFIC ISLANDS: PHILIPPINE ISLANDS: Alabat: Ramos & Edaño s.n. [Herb. Philip. Bur. Sci. 48314] (Ca--321758). Bohol: R. C. MacGregor s.n. [Herb. Philip. Bur. Sci. 124] (N); M. Ramos s.n. [Herb. Philip. Bur. Sci. 42770] (Bz--17579, Ca--242442), s.n. [Herb. Philip. Bur. Sci. 42853] (Ca--242443). Catanduanes: Ramos & Edaño s.n. [Herb. Philip. Bur. Sci. 75120] (Ca--449190, N), s.n. [Herb. Philip. Bur. Sci. 75628] (Ca--449228). Coron: G. Lopez s.n. [Herb. Philip. Bur. Sci. 41342] (Bz--17271); M. Ramos s.n. [Herb. Philip. Bur. Sci. 41148] (Bz--17274). Culion: E. D. Merrill 441 (N). Jolo: Q. Ruiz s.n. [Herb. Philip. Forest. Bur. 30005] (Ca--291732). Leyte: Edaño s.n. [Herb. Philip. Bur. Sci. 41685] (Ca--239201); Elmer 7367 (Bz--17586, N); Kondo & Edaño 112 [Philip. Nat. Herb. 36778] (Bi); Wenzel 1328 (Oa), 1479 (N, Oa), s.n. [June 21, 1915] (Oa), s.n. [June 24, 1915] (Oa). Luzon: Adduru 150 (Gg--31993); Ahern's collector s.n. [Herb. Philip. Forest. Bur. 1484] (Bz--17264, N), s.n. [Herb. Philip. Forest. Bur. 3300] (Vt); T. E. Borden s.n. [Herb. Philip. Forest. Bur. 1595] (N); Cuming 911 (M--isotype, N--isotype); Edaño s.n. [Herb. Philip. Bur. Sci. 30333] (Bz--17578), s.n. [Herb. Philip. Bur. Sci. 48678] (Bz--17575, Ca--322081, S); Elmer 6647 (N), 8064 (Bz--17589, N), 15082 (Bz--17592, Ca--272334, N, S, Ut--67343), 15124 (Bz--17269, Ca--272868, N, S, Ut--66086), 17598 (Bz--17590, Ca--271432, N, Ut--67245, V, Z--photo), 18086 (Bz--17460, Ca--270774, N, Ut--67298); F. C. Gates 6599 (Ka--60447, Ka--66826), 7769 (Mi), 7787 (Ka--62320); Haenke 579 (N); Holman s.n. [Sept. 24, 1910] (Du--66845); R. C. McGregor s.n. [Herb. Philip. Bur. Sci. 22910] (Bi, Bi); E. D. Merrill 2536 (N); Pancho 1385 (Ba); I. Ramirez s.n. [Herb. Philip. Forest. Bur. 29915] (Ca--268045); M. Ramos 1901 (Bz--17591), s.n. [Herb. Philip. Bur. Sci. 1039] (Bz--17588, N), s.n. [Herb. Philip. Bur. Sci. 23798] (W--1239180), s.n. [Herb. Philip. Bur. Sci. 32719] (Bz--17593), s.n. [Herb. Philip. Bur. Sci. 33179] (N); Reillo s.n. [Herb. Philip. Bur. Sci. 19265] (N); Robinson & Merritt s.n. [Herb. Philip. Bur. Sci. 6124] (N); F. L. Stevens 23 (Ur), 544 (Ur); Tamesis s.n. [Herb. Philip. Forest. Bur. 15363] (Bi); Vanoverbergh 17598 (Ca--324465); H. N. Whitford 487 (N). Mindanao: M. K. Clemens 271 (Bz--17272); Elmer 11190 (Bi, Bz--17587, N, Vt); Elumir s.n. [Herb. Philip. Forest. Bur. 28181] (Bz--17266); Guerrero 7 [Herb. Philip. Forest. Bur. 30367] (Bz--17267, Ca--321041); H. Hallier 4027a (Ca--918517); Kanehira 2517 (N); Quadras 335 (N); Quezon 1 [Herb. Philip. Forest. Bur. 30258] (Ca--320973); Ramos & Edaño s.n. [Herb. Philip. Bur. Sci. 49013]

(Ca--324037), s.n. [Herb. Philip. Bur. Sci. 49282] (Bz--17573, Ca--324441), s.n. [Herb. Philip. Bur. Sci. 49314] (Bz--17574, Ca-324395); Ramos & Pascasio s.n. [Herb. Philip. Bur. Sci. 34697] (Ca--215160); Wenzel 3389 (Bz--17275, Ca--354975, N); R. S. Williams 2964 (N, N); Zwickey 14 (N). Mindoro: Bermejos s.n. [Herb. Philip. Bur. Sci. 1534] (N); M. Ramos s.n. [Herb. Philip. Bur. Sci. 40933] (Bz--17577). Negros: Usteri s.n. [25/I/03] (N). Palawan: Fénix s.n. [Herb. Philip. Bur. Sci. 15568] (Bz--17270); R. B. Fox 106 [Philip. Nat. Herb. 13401] (Mi). Panay: Edaño s.n. [Herb. Philip. Bur. Sci. 46162] (Bz--17268, Ca--309637, N); Espinosa s.n. [Herb. Philip. Forest. Bur. 30146] (Ca--291924); Ramos & Edaño s.n. [Herb. Philip. Bur. Sci. 31537] (Bz--17265, N). Island undetermined: Herb. Philip. Forest. Bur. 9761 [Palis] (Bt, N); Wilkes s.n. (T). MARIANA ISLANDS: Guam: Glassman 81 (Ur). Tinian: Schubel 28 (Ur). PALAU ISLANDS: Angaur: H. St. John 21502 (Bi, Ca--902597). Koror: Herre 17 (Bi, N). Ponape: R. E. Burton 129 (Bi); Hosokawa 58381 (Bi, Mi); Kariyone 31 (Ca--287231); Takamatsu 796 (Bi, Ca--805723). Yap: Takamatsu 1824, in part (Ca--805722). INDONESIA: GREATER SUNDA ISLANDS: Banguey: Castro & Melegrito 1573 [field no. 68] (Ca--241684), 1714 [field no. 209] (Ca--241306). Celebes: Bish 68 (Bz--17281); C. B. Robinson 2465 (Bz--17282). Java: Zollinger 35.7062 (S). Miangas: H. J. Lam 3372, in part (Bz--17290, Bz, N). British North Borneo: Agama 1049 [351] (Ph). MICRONESIA: CAROLINE ISLANDS: Corol: Kanehira 79 (N). MELANESIA: NEW GUINEA: Dutch New Guinea: Aet 196 (Bz--72947); Bruyn 280 (Bz--17262); Janowsky 545 (Bz--17571, Bz--17572); Kanehira & Hatusima 13211 (Bz--17583); Kostermans 2681 (Bz--26604, Bz). Mansinam Island: Teijsmann 7788 (Bz--17584, Bz--17585). Northeastern New Guinea: Brass 29352 (W--2390942). BISMARK ARCHIPELAGO: New Britain: Commerson s.n. [Port Praslin] (P); Waterhouse 290 [Herb. Yale School Forest. 27601] (N).

CALLICARPA ERIOCLONA f. GLABRESCENS Moldenke, Résumé Suppl. 4: 9, nom. nud. June 5, 1962; Phytologia 8: 385. December 10, 1962.

Bibliography: Moldenke, Résumé Suppl. 4: 9. 1962; Moldenke, Phytologia 8: 385. 1962; Hocking, Excerpt. Bot. A.6: 455. 1963; Moldenke, Biol. Abstr. 42: 1517. 1963; Moldenke, Phytologia 14: 117, 118, & 122. 1966.

This form differs from the typical form of the species in having the mature leaf-blades varying from rather sparsely to very sparsely stellate-pubescent or even glabrescent and resinous-punctate on the lower surface.

The type of the form was collected by Takahide Hosokawa (no. 8398) at Tadiu, Truk, Caroline Islands, on August 11, 1936, and is deposited in the herbarium of the Bernice P. Bishop Museum in Honolulu.

Collectors describe this plant as a shrub, flowering in January and August, known as "ligatar" and "ligatari", growing mostly at the seashore. It is used in the treatment of boils on the arms by the natives of the Caroline Islands, and the ground-up young leaves are placed in the mouth to serve as an emetic. Material has been misidentified and distributed in herbaria under the name C. cana L.

In all, 3 herbarium specimens, including the type, have been examined by me.

Citations: MICRONESIA: CAROLINE ISLANDS: Param: Takamatsu 323 (Bi). Truk: Hosokawa 8398 (Bi--type). CULTIVATED: Caroline Islands: Abbott & Bates 45 (Bi).

CALLICARPA ERIOCLONA var. PAUCINERVIA (Merr.) Moldenke, Phytologia 8: 57. 1961.

Synonymy: Callicarpa paucinervia Merr., Philip. Journ. Sci. Bot. 9: 134--135. 1914.

Bibliography: E. D. Merr., Philip. Journ. Sci. Bot. 9: 134--135. 1914; Koidz., Bot. Mag. Tokyo 32: 136. 1918; H. J. Lam, Verbenac. Malay. Arch. 49, 76, 78, & 362. 1919; Prain, Ind. Kew. Suppl. 5: 43. 1921; Bakh., Bull. Jard. Bot. Buitenz., ser. 3, 3: 19. 1921; E. D. Merr., Enum. Philip. Flow. Pl. 3: 389. 1923; Kanehira, Fl. Micron. 457. 1933; Moldenke, Known Geogr. Distrib. Verbenac., ed. 1, 63 & 87 (1942) and ed. 2, 142 & 177. 1949; Moldenke, Phytologia 3: 296 (1950) and 8: 57. 1961; Hocking, Excerpt. Bot. A.5: 45. 1962; Moldenke, Biol. Abstr. 37: 1062. 1962; Moldenke, Résumé Suppl. 3: 22 & 30 (1962) and 4: 8 & 9. 1962; Van Steenis, Fl. Males. Bull. 18: 1069. 1963; Moldenke, Résumé Suppl. 12: 8. 1965; Moldenke, Phytologia 14: 48, 117--120, & 122. 1966.

This variety differs from the typical form of the species in its smaller leaves, which usually have only 5 pairs of secondaries and are only up to 11 cm. long and 5 cm. wide, more rounded-obtuse at the apex, and with much denser and yellowish pubescence on the lower surface, which is only stellate, not plumose.

The plant is described as an "herb" or shrub, erect, woody, branching, 0.9--3 m. tall; branchlets densely yellowish-stellate-hairy, eventually glabrescent; leaves decussate-opposite; petioles 1--1.2 cm. long, densely yellowish-stellate-hairy, eventually glabrescent; leaf-blades chartaceous or subcoriaceous, ovate or oblong-ovate, 9--11 cm. long, 4--5.5 cm. wide, rounded-obtuse or somewhat acuminate at the apex, crenulate along the margins except at the entire base, abruptly attenuate at the base, glabrous above when mature or with stellate hairs on the midrib, densely yellowish- or yellow-brown-tomentose and glandulose beneath; secondaries usually 5 pairs; venation intricate beneath, very short-puberulent; cymes small, about 2 cm. long and wide, densely yellowish-stellate-hairy, eventually glabrescent; peduncles 7 mm. long or less; flowers small; calyx 1.5 mm. long, densely stellate-hairy, the rim truncate or 4-toothed; corolla lavender, purplish-lavender, or lilac to purple, 3 mm. long, glabrous, the lobes 1.3 mm. long; stamens exserted; anthers glandulose; fruit dark-blue or

dark-purple to purple-black or black, 2 mm. wide, glabrous.

The type of the variety was collected in rocky places at Asan, Guam, in January, 1912, and is Guam Exp. Sta. 292. Collectors have found the plant growing on or at the edge of cliffs, on pure coral outcrops, along the strand, under cocomut trees, in sandy or clay soil, and in thickets at low altitudes, usually from sea-level to 33 m. altitude, flowering in January, April, May, and July to September, fruiting in January, April, and June to September. The flowers are described as "lavender" on R. Moran 4525, "lilac" on R. C. Cowan s.n., "purplish-lavender" on E. H. Bryan 1218, and "purple" on Rodin 599 and Wong 135. The fruits are described as "berries" by E. H. Bryan, but are actually drupes. Takamatsu describes the plant as "common in dry places in open forests" on Yap and "rather common in dry fields" on Babelthuap.

Vernacular names recorded for the plant are "[illegible]kyn", "garawow", "hamlat", "hatar", and "memangmah". Kondo s.n. [June 7, 1952] has Ipomoea congesta twining on it. In regard to P. K. Nelson 531 Merrill says "prob. = cana L.", but with this suggestion I do not agree. This collection is labeled as actually being a topotype of C. paucinervia.

Merrill (1914) says of the plant here under discussion "A species much resembling the Philippine Callicarpa erioclona Schauer, and probably as closely allied to that species as to any other. It differs notably in its much fewer-nerved leaves." Lam (1919) notes that "This species has an affinity with C. erioclona, but the points of difference are the number of nerve-pairs, and the stellate, never plumose, texture." Bakhuizen van den Brink (1921) included C. paucinervia in the synonymy of C. bicolor A. L. Juss., but with this disposition of it I cannot agree.

Material has been misidentified and distributed in herbaria under the names C. cana L., C. candicans (Burm. f.) Hochr., and C. erioclona Schau. In all, 43 herbarium specimens have been examined by me.

Citations: WESTERN PACIFIC ISLANDS: MARIANA ISLANDS: Aguijan: Kondo VI (Bi), s.n. [June 7, 1952] (Bi). Guam: E. H. Bryan 1142 (Bi), 1218 (Bi, Bi, Ca—995253); H. M. Mayo s.n. [Oct. 24, 1947] (Bi); G. C. Moore 339 (Ca—745141); R. Moran 4525 (Bi, Ca—51979, N, N); P. K. Nelson 531 (Bi, Bi, N); Rodin 599 (Ca—789476); O. H. Swezey s.n. [June 3, 1936] (Bi), s.n. [Machanao, June 30, 1936] (Bi). Rota: Kondo s.n. [June 25, 1952] (Bi). Saipan: Kanehira 1006 (Bi, N). Tinian: R. C. Cowan s.n. [April 3, 1945] (Bi). Island undetermined: Haenke s.n. [Anno 1792] (Bi); Hosokawa 7751 (Bi). PALAU ISLANDS: Babelthuap: Takamatsu 1229 (Bi), 1355 (Bi). Ulithi: Lessa 24 (Bi). Yap: Hosokawa 8857 (Bi, Mi); Kanehira 1242 (N); Takamatsu 1824 (Bi); C. C. Y. Wong 326 (Bi). MICRONESIA: CAROLINE ISLANDS: Kusaie: Hosokawa 6190 (Bi); Kanehira 1301 (N). Lele: S. F. Glassman 2710 (Bi, W). Truk: Hosokawa 8348 (Bi); C.

C. Y. Wong 135 (Bi). Island undetermined: Maddren s.n. [1899] (Du, Du). MELANESIA: BISMARK ARCHIPELAGO: Mussau: Køie & Olsen 1283 (Cp). Island undetermined: Dissing, Køie, & Olsen 2556 (Cp, Z).

CALLICARPA ERYTHROSTICTA Merr. & Chun, Sunyatsenia 5: 178—179, pl. 27. 1940.

Bibliography: Merr. & Chun, Sunyatsenia 5: 178—179, pl. 27. 1940; Moldenke, Phytologia 4: 75. 1952; Moldenke, Résumé 174 & 443. 1959.

Illustrations: Merr. & Chun, Sunyatsenia 5: pl. 27. 1940.

Erect shrub, 0.5—2 m. tall, subglabrous; branches terete, glabrous; ultimate branchlets slender, scarcely 1 mm. thick, shortly stellate-pubescent downwards with scattered hairs; internodes 2—3 cm. long; petioles 2—4 mm. long, shortly stellate-pubescent, glabrescent; leaf-blades chartaceous, lanceolate or broadly lanceolate to oblong-lanceolate, 4—8 cm. long, 1—2.3 cm. wide, subcaudate-acuminate at the apex, entire along the margins toward the base, distantly serrate or serrulate toward the apex, olivaceous and shiny-glabrous above or obscurely short-pubescent and glandulose on the midrib, somewhat paler and conspicuously red-glandular beneath, obscurely and shortly stellate-pubescent with scattered hairs along the midrib and larger veins; secondaries 5—8 per side, slender, distinct and elevated beneath, curvate, arcuate-anastomosing; veinlet reticulation loose, distinct; cymes axillary, 5—10 mm. long, few-flowered, more or less stellate-pubescent and glandulose; corolla pale-pink; fruiting-calyx persistent, disciform, 2 mm. wide, red-glandulose on the outer surface, its rim truncate; fruit globose, 4 mm. wide, glabrous.

The type of this species was collected by F. C. How (no. 72515) in a forest at Chang-Sha village, at an altitude of 1400 feet, Po-Ting district, Ma-Tiu Chung, Hainan Island, in anthesis on May 20, 1935. The authors cite also How 71998 from Hainan and comment "A striking differential character of this species, which manifestly belongs in the group with Callicarpa dichotoma (Lour.) Raeusch., are the numerous, shining, red glands of the lower surfaces of the leaves, and to a less degree on the midrib above, on the petioles, and on the inflorescences."

In all, 3 herbarium specimens and 2 mounted photographs of the type collection have been examined by me.

Citations: CHINESE COASTAL ISLANDS: Hainan: F. C. How 72515 (Bi—isotype, Bz—17596—isotype, N—isotype, N—photo of isotype, Z—photo of isotype).

CALLICARPA FASCICULIFLORA Merr., Philip. Journ. Sci. Bot. 17: 313—314. 1920.

Bibliography: E. D. Merr., Philip. Journ. Sci. Bot. 17: 313—314. 1920; E. D. Merr., Enum. Philip. Flow. Pl. 3: 384. 1923; A. W. Hill, Ind. Kew. Suppl. 7: 36. 1929; Moldenke, Known Geogr. Dis-

trib. Verbenac., ed. 1, 62 & 86 (1942) and ed. 2, 140 & 177. 1949; Moldenke, Résumé 182 & 444. 1959.

A shrub or small tree, the younger parts villous and stellate-tomentose, especially the branchlets and petioles; petioles 1—2 cm. long; leaf-blades thin-chartaceous, oblong to elliptic, 13—24 cm. long, 6—12 cm. wide, rather slenderly acuminate at the apex, entire or very obscurely and distantly toothed along the margins, acute at the base, olivaceous and sparingly stellate-pubescent on the midrib, secondaries, and veinlet reticulation; secondaries about 10 per side, distinct; inflorescence mostly borne in the axils of fallen leaves; flowers fascicled, sessile or short-pedicellate, the fascicles rather dense, 1—1.5 cm. wide; bracts narrow-oblong, 4—5 mm. long, stellate-pubescent; bractlets filiform, 3 mm. long; calyx densely villous or stellate-tomentose, its tube cylindric, 3 mm. long, the teeth 4, lanceolate, 1.5—2 mm. long, acuminate; corolla pale-violet, its tube 4 mm. long, externally somewhat pubescent, the lobes 4, oblong, about 2 mm. long, rounded at the apex; stamens exserted; anthers 3 mm. long; fruit globose, about 2.5 mm. wide, glabrous, enclosed by the fruiting-calyx.

The type of this species was collected by Maximo Ramos and J. Pascasio [Herb. Philip. Bur. Sci. 35123] in open forests at low altitudes, Bucas Grande, Philippine Islands, on June 9, 1919, and was deposited in the herbarium of the Bureau of Science at Manila, but is now destroyed. Merrill (1920) says "This species is readily distinguished from its congeners by its fascicled, sessile or subsessile flowers, this type of inflorescence being unknown to me in any other species of the genus."

Nothing is known to me of this taxon except what is stated in its bibliography.

CALLICARPA FERRUGINEA Sw., Prodr. 31. 1788.

Additional & emended synonymy: Callicarpa foliis lato-lanceolatis serratis subtus scabriusculis, cymis terminalibus axillaribusque Sw. apud Willd., Linn. Sp. Pl. 1: 620, in syn. 1797. Callicarpa maestrensis Urb. in Fedde, Repert. Spec. Nov. 18: 119—120. 1922.

Bibliography: Sw., Prodr. 31. 1788; J. F. Gmel., Linn. Syst. Nat., ed. 13, 2: 246. 1791; Willd., Linn. Sp. Pl. 1: 620. 1797; Sw., Fl. Ind. Occ. 1: 250. 1797; Raeusch., Nom. Bot. 37. 1797; Pers., Syn. Pl. 1: 133. 1805; W. T. Ait., Hort. Kew., ed. 2, 1: 247. 1810; Poir. in Lam., Encycl. Méth. Suppl. 2: 32—33. 1811; Roem. & Schult., Linn. Syst. Veg. 3: 95. 1818; Steud., Nom. Bot., ed. 1, 137. 1821; Spreng. in L., Syst. Veg., ed. 16, 1: 420 (1825) and 5: 126. 1828; D. Dietr., Syn. Pl. 1: 429. 1839; Steud., Nom. Bot., ed. 2, 257. 1840; Pers., Sp. Pl. 1: 343. 1842; Walp., Repert. 4: 131. 1845; Jacques & Hérincq, Man. Gén. Pl. Arb. & Arbust. 3: 503. 1845—1862; Schau. in A. DC., Prodr. 11: 646. 1847; Sagra, Hist. Cuba 2 (11): 144—145. 1850; Walp., Ann. Bot. 5: 709. 1860; Griseb., Fl. Brit. W. Ind. 499. 1861; Griseb., Cat. Pl. Cub. 216.

1866; Sauvalle, Fl. Cub. 113. 1868; O. A. Reade, Pl. Bermud. 62. 1883; Lefroy, Bull. U. S. Nat. Mus. 25: 97. 1884; W. B. Hemsl., Rep. Scient. Res. Voy. Challenger Bot. 1 (1): 128b. 1885; G. W. Johnson, Gard. Dict. 157. 1890; Fawcett, Prov. List Indig. Nat. Flow. Pl. Jamaica 30. 1893; Jacks. in Hook. f. & Jacks., Ind. Kew. 1: 386. 1893; Briq., Bull. Herb. Boiss. 4: 345. 1896; Urbina, Cat. Pl. Mex. 281. 1897; Verrill, Trans. Conn. Acad. Arts & Sci. 11 (2): 576 & 656. 1902; Millsp., Field Columb. Mus. Publ. Bot. 2: 180. 1906; H. B. Small, Bot. Bermud. 48—49. 1913; Urb. in Fedde, Repert. Spec. Nov. 18: 119—120 (1922) and 20: 345. 1924; A. W. Hill, Ind. Kew. Suppl. 7: 37. 1929; Moldenke in Fedde, Repert. Spec. Nov. 39: 298, 300, & 308 (1936) and 40: 45, 54—57, 59, 73, 78, 117, 119—121, 123—126, & 128—131. 1936; Moldenke, Alph. List Common Vern. Names 12 & 26. 1939; Moldenke, Geogr. Distrib. Avicenn. 4, 6, & 35. 1939; Moldenke, Suppl. List Common Vern. Names 23. 1940; Moldenke, Prelim. Alph. List Invalid Names 12. 1940; Moldenke, Known Geogr. Distrib. Verbenac., ed. 1, 24, 25, 71, & 86. 1942; Moldenke, Alph. List Invalid Names 10. 1942; Moldenke, Phytologia 2: 94. 1945; Moldenke, Alph. List Cit. 1: 3, 61, 75, 185, 187, 258, 259, 261, 262, 308, 310, & 319 (1946), 2: 529, 559, 565, & 647—651 (1948), 3: 664, 720, 722, 809, 833, & 929 (1949), and 4: 982, 1013, 1035, 1039, 1079, 1145, 1157, & 1206. 1949; Moldenke, Known Geogr. Distrib. Verbenac., ed. 2, 42, 46, 157, & 177. 1949; Roig y Mesa, Dicc. Bot. 2: 389, 390, & 996. 1953; Alain in León & Alain, Fl. Cuba 4: 304 & 306. 1957; Moldenke, Résumé 50, 54, 213, 245, & 444. 1959; Moldenke, Résumé Suppl. 14: 6. 1966; J. A. Clark, Card.Ind. Gen. Sp. Pl. n.d.

Recent collectors describe this plant as a low shrub, 1.5—3 m. tall, with bluish-white corollas, large fruit-clusters, and the fruit round, red or magenta to purplish or purple, flowering in April and from July to October, fruiting in January and August. It has been collected in wet woods and in dense windswept cloud-forests, on wet banks of rivulets, and on the gravel of riverbeds, at altitudes of 1000 to 3950 feet. Webster describes it as "common in rather disturbed places on rocky banks covered with moist hardwoods" in Oriente. Hemsley (1885) calls it "a common West Indian species".

O. A. Reade (1883), Lefroy (1884), and H. B. Small (1913) all record C. ferruginea from Bermuda, but this is based on an obvious misidentification, as their descriptions plainly indicate. Their plant is C. americana L., the only species of the genus known from the Bermuda Islands. The common name, "turkey berry", which they record, therefore, belongs to C. americana and not to C. ferruginea.

Material of C. ferruginea has been misidentified and distributed in herbaria under the names C. apiculata Urb., C. fulva A. Rich., and C. purpurea A. L. Juss. On the other hand, the C. Wright 430 [1860] cited by Grisebach (1866) and distributed as C. ferruginea, is actually C. fulva. Acuña 12689 greatly resembles C. fulva A. Rich. León, Clément, & Nestor 5380 is a mixture with

C. wrightii Britton & P. Wils.

In all, 98 herbarium specimens, including type material of all the names involved, and 29 mounted photographs have been examined by me.

Additional & emended citations: CUBA: Oriente: Acuña 9868 (Es), 10208 (Es), 12689 (Es, W--1881246), 13327 (Es), 13861 (Es); Alain, Clément, & Chrysogone A.877 (N); Alain & López Figueiras 7162 (Bm), 7165 (Bm); Britton & Cowell 12755 (W--698410); Mrs. G. C. Bucher 59 (N); Clément 4377 (Ha, N); Ekman 14787 (N); León 10735 (Ha), 17245 (Ha, N), 21297 (Ha, N); León & Clément 20186 (Ha, N), 23128 [July 1947] (N); León, Clément, & Nestor 5380, in part (Ha), 5447 (Ha); León, Clément, & Roca 10164 (Ha); León & Victorin 20764 (Ha, N); Linden 2088 (P); López Figueiras 2191 (Z); Shafer 8075 (W--696470); G. L. Webster 4115 (Mi). JAMAICA: N. L. Britton 208 (F--200919, W--847441); W. Harris 5292 (Us, W--387712); Harris & Britton 10554 (F--243407); W. Hooker s.n. (P); McNab s.n. [Jamaica] (Ed); Perkins 1182 (F--559990); G. R. Proctor 10114 (N); Swartz s.n. [Jamaica] (Cp--isotype, Dc--isotype, Mi--photo of type, S--isotype); G. L. Webster 5608 (Mi, S).

CALLICARPA FLOCCOSA Urb. in Fedde, Repert. Spec. Nov. 20: 345--346. 1924.

Bibliography: Urb. in Fedde, Repert. Spec. Nov. 20: 345--346. 1924; A. W. Hill, Ind. Kew. Suppl. 7: 36. 1929; Moldenke in Fedde, Repert. Spec. Nov. 39: 303 (1936) and 40: 51--52, 119, & 123. 1936; Moldenke, Brief Course Syst. Bot. Lect. 9: 2. 1937; Moldenke, Geogr. Distrib. Avicenn. 4. 1939; Moldenke, Brief Course Syst. Bot., ed. 2, 48. 1939; Moldenke, Known Geogr. Distrib. Verbenac., ed. 1, 24 & 86. 1942; Moldenke, Alph. List Cit. 1: 184. 1946; Moldenke, Brief Course Elem. Syst. Bot. 53. 1947; Moldenke, Known Geogr. Distrib. Verbenac., ed. 2, 42 & 177. 1949; Alain in León & Alain, Fl. Cuba 4: 305 & 309. 1957; Moldenke, Résumé 50 & 444. 1959.

This plant has been collected in anthesis in June and July. Material has been misidentified and distributed in herbaria as C. fulva A. Rich.

In all, 5 herbarium specimens, including the type, and 2 mounted photographs have been examined by me.

Additional citations: CUBA: Oriente: Clément, Alain, & Chrysogone 6698 (N, Z).

CALLICARPA FORMOSANA Rolfe, Journ. Bot. 20: 358--359. 1882.

Additional & emended synonymy: Callicarpa americana Blanco, Fl. Filip., ed. 1, 517. 1837 [not C. americana Hort., 1936, nor L., 1753, nor Lam., 1966, nor Lour., 1794, nor Roxb., 1945, nor Sessé & Moc., 1893, nor Willd., 1936]. Callicarpa attemuata Walp., Nov. Act. Acad. Nat. Cur. 19, suppl. 1: 384. 1843 [not C. attemuata Wall., 1829]. Callicarpa bicolor F. Vill. in Blanco,

Fl. Filip., ed. 3, Nov. App. 158. 1880 [not C. bicolor A. L. Juss., 1806, nor Schau., 1886]. Callicarpa blancoi Rolfe, Journ. Linn. Soc. Lond. Bot. 21: 315. 1884. Callicarpa ovata C. B. Robinson, Philip. Journ. Sci. Bot. 3: 215. 1908. Callicarpa ningpoensis Matsuda, Bot. Mag. Tokyo 27: 273. 1913. Callicarpa formosiana Rolfe apud Bakh., Bull. Jard. Bot. Buitenz., ser. 3, 3: 24, sphalm. 1921. Callicarpa aspera Hand.-Mazz., Anz. Akad. Wiss. Wien Math.-nat. 59: 110. 1922.

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611. 1945; E. D. Merr., Chron. Bot. 10: 210. 1946; Moldenke, Alph. List Cit. 1: 33, 103, 174, 198, 224, 235, & 284. 1946; Moldenke, Bol. Soc. Venez. Cienc. Nat. 11: 50. 1947; H. N. & A. L. Moldenke, Pl. Life 2: 50. 1948; Moldenke, Castanea 13: 120. 1948; Moldenke, Alph. List Cit. 2: 354, 404, 462, 463, 470, & 634 (1948), 3: 718, 721, 727, 728, 732, 765, 805, 837, 840, 895, & 969 (1949), and 4: 984, 1011, 1012, 1103, 1111, 1122, 1136, 1200-1202, 1224, 1234, 1238, 1259, 1260, 1289, & 1297. 1949; Moldenke, Known Geogr. Distrib. Verbenac., ed. 2, 130, 133—135, 140, 157, & 177. 1949; H. N. & A. L. Moldenke, Anal. Inst. Biol. Mex. 20: 3. 1950; Moldenke, Biol. Abstr. 26: 1471. 1952; Moldenke, Phytologia 4: 41, 77, 121, 122, & 125 (1952) and 4: 191. 1953; Moldenke, Résumé 168, 172—174, 182, 213, 241, 245, & 444. 1959; Moldenke, Résumé Suppl. 2: 7 (1960), 3: 19 & 21 (1962), and 4: 11. 1962; Li, Woody Pl. Taiwan 818—821 & 944, fig. 330. 1963; Moldenke, Résumé Suppl. 8: 3. 1964; Quisumb., Govt. Sarawak Sympos. Ecol. Res. Humid Trop. Veg. 34. 1965; Moldenke, Phytologia 13: 439 & 475 (1966) and 14: 46, 48, 53, 57—59, 107, 108, & 111. 1966.

Illustrations: Blanco, Fl. Filip. pl. 427bis [in color]. 1878—1880; T. Ito, Taiwan Shobukutu Dzusetu [Illustr. Formos. Pl.] pl. 601. 1927; Kanehira, Formos. Trees, ed. 2, fig. 599. 1936; Li, Woody Pl. Taiwan fig. 330. 1963.

Recent collectors describe this plant as a bush or shrub, a bushy or low tough shrub, half-twining shrub, tree or small tree, woody or semi-woody, slender, erect, deciduous, 1—5 m. tall, with yellowish scurfy pubescence; stems 1 or several from the same root-cluster or branched from near the base, to 8 cm. in diameter at breast height; pith large, white, tasteless; bark smooth, thin, yellowish-brown; old bark smooth and grayish, greenish and scabrid on the branchlets; wood tough, soft, greenish-white, odorless, tasteless; branchlets ascending, slender, abundantly or sparingly rebranched; young shoots and petioles ferrous-tomentose; leaves horizontal or descending, membranous or submembranous, conduplicate on the upper green or pale-green surface and yellow-green beneath, or dark-green above and paler beneath, the apex recurved, the upper sometimes narrow-elliptic, the uppermost sometimes lanceolate [cfr. f. angustata Moldenke]; inflorescence erect, axillary, with branched hairs; flowers erect, odorless or slightly scented or even with a bad odor, varying from pink, pinkish, pinkish-purple, or reddish to purplish, pale-purple, purple, "purple and red", purplish-violet, purplish-lavender, lilac, violet, or blue; stamens brown or yellow; fruit globose, shiny, at first green, later pink, reddish, red, or reddish-blue to blue, bluish, deep blue-indigo, violet, violaceous, purplish, purple, bluish-black, or black when ripe, erect.

Elmer and Matsuda mistakenly refer to the drupaceous fruits as "berries". The flowers are described as "green" on Tsui 119 [probably an error for "fruit"], "yellow" on Herb. Philip. Bur. Sci. 48766, "lilac" on Elmer 13441 and Glassman 476, "reddish" on Conklin 186, "pink or purplish" on Ching 1838, "purplish" on Kien-

holz 327 and Tsiang 2158, "purple and red" on Herb. Canton Chr. Coll. 12008 and Peng, Tak, & Kin 9, "pinkish-purple" on Chun 4874, "pale-purple" on E. D. Merrill 145, "purplish-lavender" on M. S. Clemens 17400, "purpureo-violascentes" on Owatari s.n., "purple" on Ying 347, "pinkish" on A. Henry 741 and Keng K.1021, "pink" on Au 905, Gressitt 721, Keng K.1052, Tsang 20496 & 20596, Tso 20315, and R. S. Williams 2577, "violet" on Herb. Philip. Bur. Sci. 44745, 45067, & 46383, and "blue" on Elmer 10985 and Tsui 211.

This plant has been found growing in wet or dry sandy soil, sandy gravel soil, silt or sandy silt, clay, ordinary highland soil, and dry poor more or less rocky soil of the upper cogonal region [in Mindanao], at lakesides and the edges of shady woods, in forests and primeval forests, shady woods, wooded ravines, thickets and Acacia thickets, betel-nut groves, rich woods, river thickets, grassy places, open fields, swamps, open valleys and open spaces at the sides of streams, parang and cogonal [Philippine Islands], lowland parang, and parang at the edge of cultivated land, on level land, river banks, parang slopes, hillslopes and rocky hillslopes, grassy or wooded hillsides, village commons, dry steep slopes, forested slopes, on small or grassy hills, rocky hillsides, or on hillsides among few scattered trees, as well as long roadsides and open roadsides, creeks and streamsides, and mountain roads, at altitudes of 4 to 2333 meters, flowering in every month of the year, and fruiting in February and May to December. Merrill (1926) points out that the seeds are disseminated by birds.

Sasaki s.n. [Herb. Govt. Formosa 21435] has its leaves rather small and narrow, Mori s.n. [August 10, 1936] has the uppermost leaves lanceolate, while Lau 96 has the upper leaves narrow-elliptic. These collections may represent f. angustata Moldenke or var. longifolia Suzuki. Elmer 22211 is a small-leaved form.

Lau describes C. formosana as fairly common or even abundant on Hainan Island, Tsang reports it as fairly common or abundant in Kwangtung, and Wilson describes it as common or abundant on Formosa. Bailey (1935) informs us that it is offered to the horticultural trade by the Taihoku Botanic Garden in Taihoku, Formosa. Lizardo reports that in the Philippines the leaves and twigs are pounded and used as a fish poison; Castillo, Juliano, and Buen also say that it is used as a fish poison, while Merrill states that it is employed to "stupify fish". Chung, Peng, Tak, & Kin report that it is employed in Chinese native medicine.

Vernacular names recorded for this plant are numerous, including "anadhiu", "ancyop", "ancyot", "atólba", "buraun", "chho-khng-á", "chim mei ip lo hai ngan", "for chai tsai", "horai-murasaki", "hōrai-murasaki", "hôrai-murasaki", "kabahaboha", "koodi-itu", "ku kai t'sz" [=ancient mustard seed], "lo hai ngan", "lo hai ngan muk", "lo hai ngan shue", "mfig-chiong-kun", "nan yang", "palis", "papalsis", "pe'h-chho-khng-á", "sai hong

hun", "sai ip un mat" [=small leaf origin close], "shan-puchiang", "sigbat-ta-caran", "tai-teng-hông", "tambalabás", "tambalasi", "tíagau", "tigau", "tígau", "tígau-tígau", "tigbabási", "timbabási", "ts'u-k'ang", "tubang dalag", "tubang-dalag", "túbang-dalág", and "tubaybási". Of these, I do not know which is the more generally used -- probably this depends on the locality.

M. S. Clemens 5881 & 7212 are infested with a black fungus which is probably the Uredo callicarpae Petch recorded by Arthur & Cummins (1936) as infesting this species.

It should be noted here that the C. attemuata of Wallich, referred to in the synonymy above, is actually a synonym of C. longifolia Lam.; the C. bicolor of Jussieu is a valid species, while that attributed to Schauer is C. candicans (Burm. f.) Hochr.; and the C. americana of Linnaeus is a valid species, while that attributed to "Hort." is C. longifolia Lam., that attributed to Lamarck, to Roxburgh, and to Willdenow is C. americana L., that attributed to Loureiro is C. candicans (Burm. f.) Hochr., and that of Sessé & Mociño is C. pringlei Briq.

Bakhuizen van den Brink (1921) reduces C. formosana to synonymy under C. pedunculata R. Br., a species to which it is admittedly very closely related. Li (1963) reduces C. formosana f. albiflora Yamamoto and var. longifolia Suzuki to synonymy under typical C. formosana, but I feel that they may be worthy of nomenclatural recognition.

Blanco's original (1837) description of his Callicarpa americana is as follows: "Callicarpa de America. Tronco derecho, con las ramas borrosas. Hojas opuestas, lanceoladas, aserradas y tomentosas por debajo. Peciolos cortos. Flores axilares en umbela ahorquillada, que se subdivide muchas veces. Cal. pequeño de figura de campana, con cuatro angulos apenas notables, y otros tantos dientes pequeños. Cor. apenas boquiabierta, de figura de campana, en cuatro partes redondeadas: una á un lado y tres al otro. Estam. cuatro, fijos en la base de la corola, casi iguales en altura, pero la insercion de los dos, mas alta que la de los otros. Filam. dos veces mas largos que la corola, y con direccion varia. Ant. larguitas, todas fertiles. Germen de figura de trompo. Estilo mas largo que los estambres. Estigma con dos labios. Baya con cuatro huesecillos. = Es un arbolito conocido, de la altura de cuatro ó cinco varas. Las flores son pequeñas y encarnadas. Las hojas tienen un color algo fastidioso, y mezcladas estas con los pimientos chiquitos, ó solas y estregadas dentro del agua con las manos, emborrachan al pescado, y de ahi le viene el nombre que le dan los indios: da fruto en Jul. *T, Palis, Tubang dalag."

Rolfe's original description (1882) of C. formosana reads: "Branches becoming glabrate with age, but when young, as well as the under side of the leaves, the cymes, pedicels, and calyx,

covered with a pale brown tomentum of stellate hairs. Leaves elliptical, acute or shortly acuminate, serrulate or denticulate, base rounded; 2 — 3 1/2 in. long, 1 1/2 — 2 1/2 in. broad; dark brown, sparingly pubescent above, slightly scabrid with age; veins alternate, in about five pairs; petiole 3—5 lin. long. Cymes 5 times branched, dense flowered, 4—5 times longer than petiole. Pedicels 1/2 lin. long. Calyx campanulate, scarcely 1/2 lin. long, segments minute. Corolla 1 lin. long, lobes rounded, shorter than tube. Stamens exserted 1 lin., anthers elliptical, notched at each end. Style equalling stamens. Stigma capitate. Fruit globose, scarcely 1 lin. diameter. — Tamsui, Oldham, Nos. 388, 389; Watters, Nos. 23, 82. At the foot of hills on S.W. side of Formosa, Wilford, No. 493. Also from Gregory and Swinhoe. Apparently endemic. The native name given by Mr. Watters is 'Ts'u K'ang'; he says 'The buds of the leaves and flowers are pounded and made into poultices for cuts and bruises.'"

Lam's description (1919) of C. ovata is: "A shrub, 2 M. high; branchlets, cymes and petioles densely ferruginous stellate-tomentose, glabrescent; leaves opposite, membranous, ovate-elliptic; base subrotundate, apex acutely or obtusely acuminate; margins serrate except near the base; upper side little, lower one densier stellate-hairy; nerves 8—10; 5 1/2 — 10 cM. long, 3—6 cM. broad; petioles 0.3—0.5 cM.; cymes 1 1/2 — 2 cM.; peduncles 0.5—1.1 cM.; pedicels 0.2—0.4 cM.; bracts 0.7—0.8 cM.; calyx with 4 somewhat unequal lobes; 0.09—0.12 cM. long; corolla pink, 0.23—0.25 cM.; tube 0.12—0.16 cM.; lobes 4, 0.1 cM. broad; stamens 4, 0.27—0.3 cM. long; anthers 0.07 cM.; style 0.5—0.6 cM., with 4-lobed stigma; ovary globose, 0.05 cM.; drupe glabrous, 0.25 cM. Distribution: Mindanao. We did not see any specimen of this species, but the description gives rise to the supposition that it may be identical with C. Blancoi." The type is R. S. Williams 2577 from above Darong, in the province of Davao, southeastern Mindanao, collected at an altitude of 600 feet on April 9, 1905.

Matsuda's original description (1913) of C. ningpoensis is as follows: "Shrub; branches, petioles and inflorescence thickly covered with stellate hairs; leaves opposite, petiole 7—10 mm. long, lamina oval-oblong, acuminate, subacute or rounded at base, membranaceous, or subcoriaceous in the fruiting specimen, hispidulous above, sprinkled with stellate hairs underneath and often glandular-dotted, somewhat thick haired on the nerves, serrulate, primary nerves about 5 on each side; flowering peduncle subequal to the petiole, cymes dichotomous, about 4 cm. across when in flower, becoming much larger in the fruiting specimen, flowers numerous; calyx clothed with stellate hairs, 1 mm. high, indistinctly 4-lobed, corolla 2.5 mm. high, 4-lobed, glabrous outside, stamens long exserted, filaments smooth, anthers small, style exserted, very slightly exceeding the stamens, dilated at the top; fruit a berry, glabrous, 2 mm. in diam. (Chang. no. 103). Many species of the genus are difficult to distinguish from each other."

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FEB 6 1967

SOME BRYOPHYTES FROM THE HIGHLANDS OF MEXICO

Clyde F. Reed * and Harold Robinson **

During the past five years, Dr. Jerzy Rzedowski, Instituto Politecnico Nacional, Escuela Nacional de Ciencias Biologicas, Mexico, has sent several collections of mosses and liverworts from Mexico to the senior author. Most of the collections are from altitudes from 1300 to 4500 meters. The ecological data provided with these collections are especially valuable, in view of the fact that there is considerable paucity of this type of knowledge for many of the species. While some species occur on various strata, other species are quite specific.

Two new species have been described from these collections: Oreoweisia mexicana Robinson (Bryologist, 68: 331, f. 1-5. 1965) and Metzgeria rzedowskii Robinson, in the present paper. Complete sets of the specimens of these collections are in the Reed Herbarium, Baltimore, Maryland, and in the Instituto Politecnico Nacional, Mexico; duplicates of most have been placed in the United States National Museum herbarium, Washington.

The localities in Mexico in which these collections were made are given below, along with the proper ecological data and a number, which will be referred to along with the collector and collector's number for each species.

FEDERAL I: Canada de Contreras, alrededores del 4° Dinamo, ladera andesitica con vegetation de bosque de Abies religiosa, alt. 3100 m. Mar. 28. 1965.

FEDERAL II: Desierto de los Leones, bosque de Coniferas, sobre los arboles. Sept. 23. 1964.

FEDERAL III: Alrededores de la Estacion La Cinca, Serrania del Ajusco, laderas basalticas con vegetacion de pinar abierto con abundantes gramineas, alt. 3000 m. June 13, 1965.

FEDERAL IV: Desierto de los Leones, cerca de Venta, bosque de Abies, alt. 2900 m. Sept. 23, 1964.

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** Division of Cryptogams, United States National Museum, Washington.

FEDERAL V: Desierto de los Leones, alrededor del Convento, sobre las ramas caidas de los arboles, bosque de Pinus y Abies, siendo el primero el dominante. May 30, 1965.

MEXICO I: Bosque de pino-encino, 1 km al W de Cahucan, alt. 2900 m. Mar. 28. 1965.

MEXICO II: Camino Amecameca-Tlamacas, Volcan Popocatepetl, sobre las piedras, en lugares muy humedos en el bosque de Abies, alt. 3000 m. June 20, 1964.

MEXICO III: Laguna de Santiago Tilapa, cerca de Victoria, municipio de Santiago Tanguistengo, taludes sombreados de un arroyo cercano, alt. 2600 m. Feb. 7, 1965.

MEXICO:IV: 3 km al E de San Rafael, municipio Tlalmanalco, veriente W del Iztaccihuatl, fondo de canada con vegetacion de bosque mesofico con Prunus, Garrya, Ilex, Quercus, Pinus y Abies, alt. 2700 m. May 27, 1965.

MEXICO V: 1 km. al SE de Cahucan, encinar sobre suelo rojo arcilloso, alt. 2650 m. Sept. 6, 1964.

MEXICO VI: Vertiente W del Iztaccihuatl, 2-6 km al E de San Rafael, municipio de Tlalmanalco, alt. 2750-3000 m. Feb. 28, 1965.

MEXICO:VII: Carretera a Sultepec, km. 18 approx., faldas del Nevado de Toluca, bosque de Abies, sustrato arbustivo abundante, muy humedo, alt. 2500 m. Aug. 9, 1964.

MEXICO VIII: Bosque de encino y pino, 1 km al SE de Villa del Carbon, alt. 2700 m. Mar. 28, 1965.

MEXICO IX: Nevado de Toluca, bosque de Pinus, sobre la tierra sculta, alt. 3500 m. Aug. 14, 1964.

MEXICO X: Tlamacos, Volcan Popocatepetl, alt. 4000 m. July 1962.

MEXICO XI: Volcan Popocatepetl, bosque de Abies, sobre los rocas, alt. 3000 m. June 20, 1964.

MEXICO XII: Km 75 de la carretera a Tlamacas, en las faldas del Popocatepetl, bosque de Abies, alt. 2800 m. Nov. 22, 1964.

MEXICO XIII: 1 km al S de Atlapulco, sobre la cerretera a Chalma, orilla de camino, alt. 2800 m. Feb. 7, 1965.

MEXICO XIV: Cumbre del Cerro Gordo, cerca de San Martin de las Piramides, ladera basaltica con vegetacion de bosque de encino, alt. 3000 m. July 4, 1965.

MEXICO XV: Tlamacas, Popocatepetl, tundra alpina, sobre ceniza volcanica, alt. 4100 m. June 20, 1964.

MEXICO XVI: Vertiente E del Cerro Gordo, cerca de San Martin de las Piramides, ladera basaltica con vegetacion de matorral de Opuntia, Zaluzania y Mimosa, alt. 2500 m. July 4, 1965.

MEXICO XVII: Crater Nevado de Toluca, sobre las rocas, abundante, tundra alpina, alt. 4100 m. Aug. 20, 1962.

MEXICO XVIII: Camino la Palma-Basura Veracruz, suelos lateriticos muy humedos, alt. 100 m. Mar. 21, 1965.

MEXICO XIX: Nevado de Toluca, bosque de Abies de estrato arbustivo muy denso, alt. 3300 m. Aug. 20, 1962.

MEXICO XX: Carretera Ixtapan de la Sal-Cacahua milpa. a la orilla de la cerretera, alt. 2000 m. Oct. 4, 1964.

MEXICO XXI: Carretera Mexico-Toluca a la altúca del Posque Nacional de Salazar, a la orilla de la cerretera, alt. 3000 m. Oct. 3, 1964.

MEXICO XXII: Nevado de Toluca, reg. de San Pedro Tlamixco, alt. 3400 m. Oct. 1958.

MEXICO XXIII: Carretera Popo-parck-Ozumba, suelo muy humedos, abundante, con esporangios inmaduros. Aug. 9, 1964.

DURANGO I: Puerto Buenos Aires, cerretera El Salto, Mazatlan, bosque de Coniferas, alt. 2600 m. Sept. 21, 1961.

MORELOS I: 10 km al NNE de Cuernavaca, sobre la autopista a Mexico, bosque de Quercus y Abies con Styrax y Ternstroemia, alt. 2150 m. Aug. 7, 1964.

MORELOS II: Lagunas de Zempoala, bosque de Pinus y Abies, alt. 2900 m. Aug. 5, 1962.

MORELOS III: 10 km al ESE de Cuajomulco, km 59 supercarretera Mexico-Cuernavaca, ladera basaltica con vegetacion de bosque mesofilo con Quercus, Abies, Meliosma, Styrax, alt. 2150 m. May 25, 1965.

VERACRUZ I: 10 km antes de Huatsusco, carretera Huatusco-Cordoba, bosque de Liquidambar, muy humedo, alt. 1450 m. Oct. 11, 1964.

VERACRUZ II: 12 km al E de Cordoba, cerca de Atoyaquillo, cafetal a la sombra de bosque secundario en ladera caliza, alt. 650 m. Oct. 12, 1964.

VERACRUZ III: Cerca del Punta sobre al Rio Jamapa entre Huatusco y Coscomatepec, sobre las liedras a la orilla del Rio, alt. 1400 m. Oct. 11, 1964.

VERACRUZ IV: Alrededores de Orizaba, sobre la corteza de los arboles, clima templado frio, a las faldas del Volcan Pico de Oribaza. May 5, 1964.

VERACRUZ V: En los lugares muy humedos, sobre la corteza de los arboles, alrededores de Jalapa, Salto del Gato, alt. 1400 m. Sept. 19, 1964.

OAXACA I: Cerce de Santa Rosa, municipio de Juquila, km 195 carretera Oaxaca-Puerto Escondido, ladera granitica con vegetacion de bosque seco de pino y encino con Clethra y Saurauia, alt. 1300 m. Apr. 13, 1965.

OAXACA II: 10 km al N de Lachao, municipio de Juquila, km 170 carretera Oaxaca-Puerto Escondido, ladera con vegetacion de bosque seco de pino y encino, alt. 1800 m. Apr. 15, 1965.

GUERRERO I: Cerro Teotepec, municipio de Tlacotepec, rocas graniticas cubiertas de musgos, alt. 3200 m. Aug. 10, 1964.

GUERRERO II: Cerro Teotepec, municipio de Tlacotepec, bosque de Pinus y Abies con abundantes gramineas, alt. 3200 m. Aug. 10, 1964.

GUERRERO III: Aserradera Agua Fria, municipio de Tlacotepec, bosque de Quercus, Abies y Clethra, alt. 2600 m. Aug. 11, 1964.

HEPATICAE

LOPHOCOLEACEAE

1. Lophocolea bidentata (Linn.) Dum. — FEDERAL I: Rzedowski 19467.

JUNGERMANNIACEAE

2. Jungermannia linguifolia Gottsche — FEDERAL I: Rzedowski 19458.

PORELLACEAE

3. Porella arborea (Taylor) Spruce — MORELOS I: Rzedowski 18550.

LEJEUNEACEAE

4. Ceratolejeunea flagelliformis (Steph.) Fulford — VERACRUZ I: Ma. E. Sanchez R. 71.

PELLIACEAE

5. Noteroclada confluens Tayl. ex Hook. et Wils. — FEDERAL I: Rzedowski 19460; MEXICO I: Roberto Cruz C. 189.

METGERIACEAE

6. Metzgeria conjugata Lindenb. — MEXICO II: Ma. E. Sanchez R.

7. Metzgeria rzedowskii H. Robinson, n. sp.

Longissima, pallide, virens. Frons ad 10 cm. longa, pauciramosa. Costa valida, subteres. Cellulae costae anticae 3-8 plerumque 6-seriatae, posticae 4-11, plerumque 6-7-seriatae denseque setulosae. Alae valde decurvae, subinvolutae, in facie nudae, marginibus dense setulosis, setuli geminatum oppositus. Cellulae frondis 50-75 mu x 40-50 mu, trigonis nullis. HOLOTYPUS: Mexico, Dist. Federal; Canada de Contreras, alrededores del 4º Dinamo, ladera andesitica con vegetacion de bosque de Abies religiosa, alt. 3100 m. Mar. 28, 1965. Rzedowski 19476. ISOTYPUS in REED HERB.; PARATYPUS: Mexico, 3 km al E de San Rafael, municipio de Tlalmanalco, vertiente W del Ixtaccihuatl, fondo de canada con vegetacion de bosque mesofilo con Prunus, Garrya, Ilex, Quercus, Pinus y Abies, alt. 2700 m. May 27, 1965. Rzedowski 19869. HOLOTYPUS in U.S.

Metzgeria rzedowskii is very close to M. gigantea Steph. of Bolivia. Both have large fronds with hairs on the margin and the undersurface of the costa. In both, the fully developed costa has 6 or more cortical cells on each surface and 50-70 medullary cells. In the Mexican material, however, the marginal cells are distinctly paired on the margin, while those of M. gigantea are more clustered and not completely restricted to the marginal hairs. The hairs of M. gigantea are generally more sinuous and thinner (ca. 15 mu wide). The hairs of M. rzedowskii are mostly 20 mu wide and are strongly curved, giving the plant the superficial appearance of M. hamata Lindb. The Mexican species is apparently dioicous and bears numerous male branches. These are lateral on the ventral surface of the costa, short, deeply cup-shaped with a narrow essentially entire margined slit on the upper side, and contain usually 3 or 4 antheridia.

MARCHANTIACEAE

8. Dumortiera hirsuta (Sw.) Nees — MEXICO I: Roberto Cruz C. 191; OAXACA I: Rzedowski 19585.

9. Marchantia domingensis Lehm. et Lindenb. — FEDERAL I: Rzedowski 19484; VERACRUZ I: Ma. E. Sanchez R.

10. Marchantia paleacea Bertol. — MEXICO I: Roberto Cruz C. 191; MEXICO III: Rzedowski 19422.

11. Marchantia polymorpha Linn. — MEXICO I: Roberto Cruz C. 195; MEXICO III: Rzedowski 19882.

REBOULIACEAE

12. Asterella elegans (Spreng.) Trevis. — MEXICO V: Rzedowski 18738. 18737, 18750; MORELOS I: Rzedowski 18497.

13. Reboulia hemisphaerica (Linn.) Raddi — MEXICO III: Rzedowski 19421, con Campylium hispidulum.

TARGIONIACEAE

14. Targionia hypophylla Linn. — MEXICO VI: Roberto Cruz C. 125.

ANTHOCEROTACEAE

15. Anthoceros laevis Linn. — MEXICO III: Rzedowski 19421A, con Leptobryum pyriforme (Hedw.) Schimp.

16. Anthoceros punctatus Linn. — FEDERAL I: Rzedowski 19473.

17. Notothylas orbicularis (Schweinitz) Sull. — VERACRUZ I: Ma. E. Sanchez R.

MUSCI

FISSIDENTACEAE

1. Fissidens asplenioides Hedw. — MEXICO III: Rzedowski 19420.

DITRICHACEAE

2. Ceratodon purpureus (Hedw.) Brid. — MEXICO VII: Giovanini y Sauceda, con Bryum argenteum.

3. Ceratodon stenocarpus B.S.G. — MEXICO VIII: R. Cruz C. 172; MEXICO IX: Ma. E. Sanchez; MEXICO X: G. Guzman; GUERRERO I: Rzedowski 18589.

DICRANACEAE

4. Dicranum sumichrasti Duby — GUERRERO II: Rzedowski 18584.

5. Oreoweisia mexicana H. Robinson — GUERRERO I: Rzedowski 18589 (HOLOTYPUS - US; dupl. in REED HERB. and Rzedowski HERB.)

6. Symblepharis helicophylla Mont. — FEDERAL I: Rzedowski 19478; MEXICO XII: Rzedowski 19170; MEXICO IV: Rzedowski 19860; MEXICO VI: R. Cruz C. 117, 125A, 96; MEXICO XI: Ma. E. Sanchez R.; MEXICO II: Ma. E. Sanchez R.; FEDERAL V: Salgado y Villegas; DURANGO I: G.Guzman; MORELOS II: Rzedowski; GUERRERO II: Rzedowski 18584A.

LEUCOBRYACEAE

7. Octoblepharum albidum Hedw. — VERACRUZ II: Rzedowski 19095.

POTTIACEAE

8. Barbula bescherellei Sauerb. — MEXICO XIII: Rzedowski 19412; Ma. E. Sanchez R.

9. Bryoerythrophyllum recurvirostrum (Hedw.) Chen. — FEDERAL I: Rzedowski 19479.

10. Didymodon campylocarpus (C.Mull.) Broth. — MEXICO VI: Rzedowski 18741 y 18744.

11. Hyophila involuta (Hook.) Jaeg. & Sauerb. (H. tortula (Schwaegr.) Hampe). — VERACRUZ III: Ma. E. Sanchez R. 95.

12. Leptodontium sulphureum (C.Mull.) Mitt. — OAXACA II: Rzedowski

13. Leptodontium ulocalyx (C.Mull.) Mitt. - MEXICO II: Ma. E. Sanchez R. MEXICO VII: Giovanini y Saucedo.

14. Morinia ehrenbergiana (C.Müll.) Ther. — FEDERAL I: Rzedowski 19469.

15. Rhexophyllum subnigrum (Mitt.) Ther. et Hilp. — MEXICO XIV: Rzedowski 20060.

16. Tortula andicola Mont. — MEXICO XV: Ma. E. Sanchez R.

17. Tortula caroliniana Andrews — MEXICO I: Roberto Cruz C., con Orthotrichum pycnophyllum.

18. Tortula fragilis Tayl. — MEXICO XIV: Rzedowski 20059.

19. Tortula ruralis (Hedw.) Smith — MEXICO XVI: Rzedowski 20029.

20. Trichostomum cylindricum (Bruch) C.Müll. — MEXICO V: Rzedowski 18746.

GRIMMIACEAE

21. Grimmia fusco-lutea Hook. — MEXICO XVII: R. Cruz C.

22. Grimmia trichophylla Grev. — MEXICO XIV: Rzedowski 20056.

FUNARIACEAE

23. Funaria hygrometrica Hedw. — FEDERAL I: Rzedowski 18480; MEXICO XVIII: Roberto Cruz C. 125; MEXICO XIX: R. Cruz C.; VERACRUZ I: Ma. E. Sanchez R. 76.

BRYACEAE

24. Anomobryum filiforme (Dicks.) Husn. — MEXICO: Rio Frio. May 7, 1962. G.Guzman; MEXICO V: Rzedowski 18739, 18736 y 18740.

25. Brachymenium spirifolium (C.Mull.) Jaeg. — VERACRUZ IV: David Garcia S.

26. Brachymenium systylium (C.Mull.) Jaeg. — DURANGO I: G.Guzman.

27. Bryum argenteum Hedw. — GUERRERO I: Rzedowski 18591; MEXICO XV: Ma. E. Sanchez R.; MEXICO IX: Ma. E. Sanchez R.; MEXICO XX: Ma. Elena Sanchez de Cruz 62; MEXICO XXI: Roberto Cruz C. 61.

28. Bryum capillare Hedw. — MEXICO IX: Ma. E. Sanchez R.; MEXICO VII: Giovanini y Saucedo.

29. Bryum procerum Schimp. in Besch. — DURANGO I: Gaston Guzman; MEXICO XI: Ma. E. Sanchez R.

30. Bryum truncorum Brid. — MEXICO V: Rzedowski 18742; MORELOS I: Rzedowski 18496; VERACRUZ III: Ma. E. Sanchez R. 96.

31. Pohlia integridens (C.Mull.) Broth. — FEDERAL I: Rzedowski 19477, con Anomobryum filiforme; MEXICO II: Ma. E. Sanchez R; MEXICO V: Rzedowski 18735; GUERRERO I: Rzedowski 18587, 18586, 18588,y 18590.

MNIACEAE

32. Mnium rostratum Schrad. — MORELOS III: Rzedowski 19830.

BARTRAMIACEAE

33. Anacolia intertexta (Schimp.) Jaeg. — MEXICO VI: R. Cruz C. 122.

34. Bartramia microstoma Mitt. — FEDERAL I: Rzedowski 19483.

35. Bartramia schimperi C.Mull. — FEDERAL I: Rzedowski 19463; MEXICO VII: Giovanini y Saucedo.

36. Breutelia deflexifolia Card. -- FEDERAL I: Rzedowski 19461.

37. Philonotis fontana (Hedw.) Brid. — MEXICO XXII: G.Guzman.

TIMMIACEAE

38. Timmiella anomala (Bruch & Schimp.) Limpr. — MORELOS III: Rzedowski 19837; MEXICO VI: Roberto Cruz C. 125, con Targonia hypophylla L.

PTYCHOMITRIACEAE

39. Ptychomitrium lepidomitrium (C.Mull.) Schimp. — FEDERAL I: Rzedowski 19485; FEDERAL V: A. Ma. Salgado y M. Villegas.

ORTHOTRICHACEAE

40. Macromitrium fragilicuspis Card. — VERACRUZ V: A. Rebolledo.

41. Orthotrichum pycnophyllum Schimp. — MEXICO XVI: Rzedowski 20054; MEXICO I: Roberto Cruz C. 176, con Stereodon falcatus y Tortula caroliniana; MEXICO XV: Ma. E. Sanchez R.

42. Schlotheimia rugifolia (Hook.) Schwaegr. — VERACRUZ V: A. Rebolledo.

RHACOPILACEAE

43. Rhacopilum tomentosum (Hedw.) Brid. — VERACRUZ I: Ma. E. Sanchez R. 71, con Mnium rostratum y Mittenothamnium reptans; Ma. E. Sanchez y F. Sanchez 75.

HEDWIGIACEAE

44. Braunia secunda (Hook.) B.S.G. — MEXICO XXIII: Rzedowski.

45. Hedwigia ciliata (Hedw.) Beauv. — VERACRUZ III: Ma. E. Sanchez R. 92.

LEUCODONTACEAE

46. Leucodon cryptotheca Hampe — FEDERAL II: Ivonne Rojano.

PTEROBRYACEAE

47. Calyptothecium duplicatum (Schwaegr.) Broth. — VERACRUZ V: A. Rebolledo, con Meteorium teres.

METEORIACEAE

48. Meteorium teres Mitt. — VERACRUZ V: A. Rebolledo.

49. Papillaria deppei (Hornsch.) Jaeg. — VERACRUZ V: A. Rebolledo.

NECKERACEAE

50. Neckera ehrenbergii C.Müll. — MORELOS I: Rzedowski 18498.

HYPOPTERYGIACEAE

51. Hypopterygium tamariscinum (Hedw.) Brid. — VERACRUZ V: A. Rebolledo.

LESKEACEAE

52. Herpetineurum toccoae (Sull. et Lesq.) Card. — VERACRUZ I: Ma. E. Sanchez R., con Rhacopilum tomentosum.

53. Leskea angustata Tayl. — MEXICO XIV: Rzedowski 20055.

54. Lindbergia mexicana (Besch.) Card. — MEXICO V: Rzedowski 18745.

THUIDIACEAE

55. Thuidium delicatulum (Hedw.) Mitt. — VERACRUZ V: A. Rebolledo.

56. Thuidium philbertii Limpr. — MEXICO II: Ma. E. Sanchez R.

AMBLYSTEGIACEAE

57. Campylium hispidulum (Brid.) Mitt. — MEXICO III: Rzedowski 19421, con Reboulia hemisphaerica.

BRACHYTHECIACEAE

58. Brachythecium corbierei Card. — FEDERAL I: Rzedowski 19462; MEXICO II: Espinoza Russi.

59. Brachythecium frigidum (C.Müll.) Besch. — FEDERAL I: Rzedowski 19457 y 19471.

60. Brachythecium plumosum (Hedw.) B.S.G. — FEDERAL I: Rzedowski 19468, 19472, 19486, 19478 y 19459.

61. Brachythecium stereopoma (Spruce) Jaeg. — MEXICO I: R. Cruz 174.

62. Bryhnia stokesii (Turn.) H. Robinson — FEDERAL I: Rzedowski 19475, 19474 y 19465.

63. Eurhynchium riparioides (Hedw.) Rich. — VERACRUZ III: Ma. E. Sanchez R. 93.

ENTODONTACEAE

64. Entodon abbreviatus (Schimp. ex Besch.) Jaeg. — MORELOS III: Rzedowski 19836; MORELOS I: Rzedowski 18499; MEXICO XI: G.Guzman, con Symblepharos helicophylla.

65. Entodon erythropus Mitt. — FEDERAL III: Rzedowski 19926.

66. Entodon jamesonii (Tayl.) Mitt. — MORELOS I: Rzedowski 18501.

67. Rozea bourgaeana Besch. — MEXICO VI: R. Cruz C; MEXICO IV: Rzedowski, con Symblepharis helicophylla; MORELOS II: Rzedowski.

PLAGIOTHECIACEAE

68. Plagiothecium denticulatum (Hedw.) B.S.G. — FEDERAL I: Rzedowski 19481, 19482 y 19466.

SEMATOPHYLLACEAE

69. Sematophyllum caespitosum (Hedw.) Mitt. — FEDERAL IV: Rzedowski 18785.

70. Sematophyllum cuspidatum Mitt. — VERACRUZ III: Ma. E. Sanchez R.94.

71. Sematophyllum lindigii (Hampe) Mitt. — MORELOS II: Rzedowski.

HYPNACEAE

72. Stereodon falcatus (Schimp.) Fleisch. — MEXICO XIV: Rzedowski 20058 y 20053; MEXICO I: R. Cruz C.,con Orthotrichum pycnophyllum; MEXICO V: Rzedowski 18743; FEDERAL V: Salgado y Villegas; DURANGO I: Gaston Guzman.

POLYTRICHACEAE

73. Pogonatum cuspidatum Besch. — MEXICO I: R. Cruz C. 175; GUERRERO I: Rzedowski 18585.

74. Pogonatum subflexuosum (Lor.) Broth. — FEDERAL I: Rzedowski 19464; MEXICO XIX: R. Cruz C; MEXICO V: Rzedowski 18734; GUERRERO III: Rzedowski 18623; GUERRERO I: Rzedowski 18583.

75. Polytrichum juniperinum Hedw. — MEXICO II: Ma. E. Sanchez R.

NOTES ON THE GENUS INGA

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While working towards a revision of the genus Inga (Leguminosae), I found seven species and one variety as yet undescribed. An additional taxon has been elevated to specific rank while a tenth taxon has been elevated from forma to variety.

Inga is a large genus (ca. 400 species) restricted to the New World tropics. George Bentham (1845) divided the genus into five sections, the sections being based mainly on the indument of the flowers and the shape of the legume. All the new taxa and combinations belong to Section Inga Series Inga which is characterized by pubescent flowers and a terete, multisulcate legume. A revision of Section Inga Series Inga is forthcoming.

INGA EGLANDULOSA Elias, sp. nov.

Arbor parva, ramuli subteretes, dense brevi-pilosi. Foliola 3-5 juga, 8-18 cm longa, 4-8 cm lata, elliptica, rotunda ad basim, acuta ad brevi-acuminata, mucronata, parce pilosa supra praeter dense pilosa subter, opaca subter, subcoriacea, venae laterales 18-28 jugae, conspicuae; petiolulus 1.0-1.5 mm longus, dense pilosus; petiolus 2-3 cm longus, dense pilosus, exalatus; rhachis 7-14 cm longa, dense ferrugineo-pilosa, parte alata, ala 16-18 mm lata, obovata, parce pilosa supra, dense pilosa, conspicue venosa subter; stipulae caducae, 3-5 cm longae, late ovatae; glandulae rhachidis absentiae vel inconspicuae.

Inflorescentia spicata, 2-5 cm longa, singulatim ad aliquot, terminalis vel in superioribus axillis disposita, 18-40 floribus; bracteae caducae, 3-5 mm longae, acutae, dense villosae; gemmae ellipsoideae, acutae, dense villosae; pedunculi 1.5-2.5 cm longi, dense pilosi; calyx 10-12 mm longus, tubulosus ad subcampanulatus, dense villosus, sessilis, lobis 2-3 mm longis, acutis, dense villosis; corolla 18-20 mm longa, tubulosa, parce dilata ad apicem, dense sericea, lobis 4-6 mm longis, acutis, dense sericeis; tubus staminum exsertus 2-6 mm, filamenta alba, 2-6 mm longa, antherae dorsifixae, 0.25-0.50 mm longae; pistillum 3.5-4.5 cm longum, ovarium 2-3 mm longum, bisulcatum, glabrum, stylus filiformis, stigma capitatum.

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2) I am especially grateful to Dr. Robert H. Mohlenbrock for his assistance and to Dr. John D. Dwyer for reviewing the manuscript.

Legumen subterete, 60-80 cm longum, 1.5-2.0 cm in diametro, sulcatum, dense brevi-pilosum.

This species bears a superficial resemblance to I. codonantha but can be distinguished from the latter species by the non-pedicellate flowers, partially winged rachis, and shorter corolla.

The type specimen was collected in Colombia at 950 m where it flowers in March. This species is known only from the type collection.

Type: Uribe 944, from Colombia.

Specimens cited: Colombia: Valle de Cauca: Ginebra, Uribe 944 (COL).

INGA ALATOCARPA Elias, sp. nov.

Arbor 5-10 m alta; rami teretes, glabri, parce lenticellati, ramuli subteres vel angulati, parce ferrugineo-villosi, parce lenticellati. Foliola 3-4 juga, 8-22 cm longa, 4-11 cm lata, late elliptica vel obovata, rotunda ad basim, brevi-acuminata ad acuta, glabrescentia ad parce hirtella supra et subter, sub-nitentia supra, opaca subter, subchartacea, laterales venae 18-36 jugae, parce conspicuae subter; petiolulus 3-4 mm longus, dense ferrugineo-villosus, nigrescens maturitate; petiolus 4-6 cm longus, parce villosus, exalatus, parce tumidus ad basim; rhachis 12-16 cm longa, parce ferrugineo-villosa, exparte alata, ala 11-16 mm lata, oblonga ad elliptica, parce ferrugineo-villosa supra et subter; stipulae subpersistentes, 8-12 mm longae, cordatae, profunde striatae; glandulae rhachidis 2 mm in diametro, saepe contortae, sessiles, crassis marginibus.

Inflorescentia spicata, 3-5 cm longa, 2-4 per fasciculum, in superioribus axillis disposita, 24-40 floribus; bracteae persistentes, 6-10 mm longae, lanceolatae vel anguste ovatae, parce villosae, striatae; gemmae usque ad 14 mm longae, oblon-goideae, obtusae ad acutae, parce villosae; pedunculi 2-6 cm longi, villosi; calyx 13-16 mm longus, tubulosus, parce villosus, sessilis, striatus, lobis 1-2 mm longis, anguste ovatis, parce villosis; corolla 26-30 mm longa, tubulosa, parce dilata ad apicem, longo-sericea, lobis 5-7 mm longis, lanceolatis ad anguste ovatis dense longo-sericeis; tubus staminum inclusus; filamenta alba 5-6 cm longa; antherae non visae; pistillum 6-7 cm longum; ovarium 3 mm longum, bisulcatum, glabrum, stylus filiformis, stigma capitatum.

Legumen tetragonum, 45-70 cm longum, 1.2-1.3 cm latum, sessile, sulcatum marginibus dilatis, valvis conspicuis, 6-10 mm latis, dense villosum.

This species is known only from the type location. The length of the flowers and the cordate stipules distinguish this

new species from other members of Section Inga. Inga alatocarpa was placed in Series Inga because of the sulcate margins of the legumes. This species is possibly an intermediate between Series Inga and Series Tetragonae.

The specific epithet was chosen because of the distinctly winged margins of the legume.

Type: Little 6278, from Ecuador.

Specimens cited: Ecuador: Esmeraldas: San Lorenzo near Rio Nadadero, Little 6278 (F holotype, US isotype).

INGA VALLENSIS Elias, sp. nov.

Arbor; ramuli subteres vel angulati, dense ferrugineo-villosi. Foliola 4-6 juga, 6-16 cm longa, 2-7 cm lata, oblongo-elliptica vel elliptico-obovata, rotunda ad basim, obtusa vel acuta, mucronulata, pilosa supra praeter dense pilosa in venis, pilosa subter praeter dense pilosas venas, subnitentia supra, opaca subter, subcoriacea, laterales venae 10-16 jugae, conspicuae subter; petiolulus 1.5-2.0 mm longus, dense villosus; petiolus 2-3 cm longus, dense villosus, exalatus; rhachis 6-15 cm longa, dense villosa, alata, ala 5-8 mm lata, elliptica vel obovata, pilosa supra et subter, venae conspicuae subter; stipulae caducae, 4-5 mm longae, ovatae; glandulae rhachidis usque ad 1 mm in diametro, orbiculatae, sessiles cum marginibus angustis.

Inflorescentiae racemosae, 1.0-2.5 cm longae, productis singulatim vel geminatis, terminales vel in superioribus axillis dispositae, 10-18 floribus; bracteae caducae, 1-2 mm longae, ovato-lanceolatae; gemmae 4-8 mm longae, globoideae, rotundeae, dense villosae; pedunculi 3-4 cm longi, dense villosi; calyx (excludus pedicellus) 8-10 mm longus, late campanulatus, dense villosus, pedicellatus, pedicellus 8-10 mm longus, lobis imparibus, 1.5-3.0 mm longis, acutis, dense villosis; corolla 22-25 cm longa, late tubulosa, dilata ad apicem, sericea, lobis 3-5 mm longis, acutis, sericeis; tubus staminum inclusus; filamenta virdi-alba, 5-7 cm longa, antherae dorsifixae, usque ad 0.75 mm longae; pistillum 4.5-5.5 cm longum, ovarium 2.5-4.0 mm longum, bisulcatum, glabrum, stylus filiformis, stigma capitatum.

Legumen immaturum, terete, sulcatum, dense ferrugineo-villosum.

The type specimen was originally determined I. spuria forma racemaria by E. P. Killip. A comparison with the type of I. spuria forma racemaria showed the two to be distinct taxa.

Inga vallensis is easily distinguished from I. ingoides by its longer flowers.

Inga vallensis has been collected at altitudes of 1050-1100 m.

Type: Cuatrecasas 23072, from Colombia.

Specimens cited: Colombia: Valle de Cauca: Ansermanuevo, Cuatrecasas 23072 (F holotype, US isotype).

INGA EXALATA Elias, sp. nov.

Arbor 8-12 m alta; rami teretes, glabri; ramuli teretes vel angulati, dense ferrugineo-villosi, inconspicue lenticellati. Foliola 3-4 juga, 6-16 cm longa, 3-6 cm lata, elliptica vel elliptico-obovata, rotunda ad basim, acuta vel brevi-acuminata, mucronulata, pilosa supra praeter dense pilosa in venis, dense pilosa subter, subnitentia supra, obscura subter, subcoriacea, laterales venae 12-16 jugae, conspicuae subter; petiolulus 2-3 mm longus, dense ferrugineo-villosus; petiolus 1.5-3.5 cm longus, exalatus; rhachis 2-6 cm longa, dense ferrugineo-villosa, exalata; stipulae caducae, non visae; glandulae rhachidis praesentes vel absentes, 0.25-0.50 mm in diametro, orbiculatae, stipitatae, stipe usque ad 1.5 mm longo.

Inflorescentiae spicatae, 1.5-3.0 cm longae, in axillis superioribus dispositae, 14-26 floribus; bracteae caducae, 1-3 mm longae, ovatae, dense ferrugineo-villosae; gemmae rotundae, plerumque obtusae, dense villosae; pedunculi 2-4 cm longi, dense ferrugineo-villosi; calyx 10-14 mm longus, late tubulosus, sessilis, dense villosus; corolla 18-22 mm longa, dilata ad apicem, dense sericea; tubus staminum inclusus; filamenta 4-5 cm longa, antherae non visae; pistillum 4.5-5.5 cm longum, ovarium 2-3 mm longum, bisulcatum, glabrum, stylus filiformis, stigma capitatum.

Legumen ignotum.

The presence of the tiny, stipitate, leaf-rachis glands could be easily overlooked. The glands along with the unwinged rachis distinguish this species.

This species is known only from the type collection.

Type: Brenes 3634, from Costa Rica.

Specimens cited: Costa Rica: Cartago: Jesus de San Ramion, Brenes 3634 (F).

INGA BOREALIS Elias, sp. nov.

Arbor 10 m alta; ramuli subteretes, dense ferrugineo-villosi, lenticellati. Foliola 3 juga, 6-14 cm longa, 2.5-7.5 cm lata, rotunda ad basim, acuta, mucronata, parce puberulenta supra praeter dense puberulentas venas, parce puberulenta vel

tomentosa subter, opaca supra et subter, laterales venae 12-16 jugae, conspicuae subter, petiolulus 2-3 mm longus, dense villosus; petiolus 2-3 cm longus, dense villosus, exalatus vel parte alatus, ala 4-6 mm lata, unpar; rhachis 4-6 cm longa, dense villosa, alata, ala 6-12 mm lata, obovata, parce puberula supra, tomentosa subter; stipulae caducae 2-3 mm longae, ovatae; glandulae rhachidis 2.0-2.5 mm in diametro, orbiculatae, subsessiles, marginibus conspicuis.

Inflorescentiae spicatae, 2-4 cm longae, productis singulatim vel 2-4 per fasciculum, in superioribus axillis dispositae vel terminales, 14-28 floribus; bracteae oblanceolatae vel elliptico-oblanceolatae, 12-16 mm longae, persistentes, dense villosae; gemmae 4-12 mm longae, oblanceoideae, rotundeae ad apicem, dense villosae; pedunculi 1-4 cm longi, dense villosi; calyx 8-11 mm longus, tubulosus, substriatus, dense villosus, sessilis, lobis 2-3 mm longis, anguste ovatis, dense villosis; corolla 18-22 mm longa, anguste tubulosa, dilata ad apicem, sericea, lobis 2-3 mm longis, anguste ovatis, sericeis; tubus staminum includus; filamenta alba, antherae usque ad 0.2 mm longae, dorsifixae; pistillum 5-6 cm longum, ovarium 2-3 mm longum, bisulcatum, glabrum, stylus filiformis, stigma capitatum.

Legumen ignotum.

This species is known only from the type collection. Inga borealis resembles I. xalapensis in that the bracts are persistent. The oblanceolate bracts and longer corolla distinguish I. borealis from I. xalapensis.

The specific epithet was chosen because this taxon is on the northern-most range of the genus.

Type: King 4275, from Mexico.

Specimens cited: Mexico: San Luis Potosi: 2 miles W of Xilitia, King 4275 (NY holotype, US isotype).

INGA BREVITUBA Elias, sp. nov.

Arbor; ramuli valde angulati, ferrugineo-villosi, lenticellati. Foliola 3-4 juga, 8-18 cm longa, 4-8 cm lata, rotunda vel subobliqua ad basim, acuta, mucronata, ferrugineo-villosa supra, pilosa subter, venae dense ferrugineo-pilosae supra et subter, lamina subnitens supra, opaca subter, subcoriacea, laterales venae 12-18 jugae, conspicuae subter; petiolulus 2-3 mm longus, dense ferrugineo-villosus, exalatus; rhachis 6-12 cm longa, dense ferrugineo-villosa, alata, ala 7-15 mm lata, elliptica vel obovata, pilosa supra et subter; stipulae non visae; glandulae rhachidis 2-3 mm in diametro, orbiculatae, saepe contortae, sessiles, angustis marginibus.

Inflorescentiae spicatae, 2-4 cm longae, productis singulatim vel geminatis, in superioribus axillis dispositae, 40-70 floribus; bracteae caducae, 1-2 mm longae, ovatae, dense villosae; gemmae 3-6 mm longae, obovoideae, rotundeae ad apicem, parce villosae; pedunculi 3.5-6.0 cm longi, dense ferrugineo-villosi; calyx 2.0-2.5 mm longus, campanulatus, parce villosus, sessilis, lobis 0.5 mm longis , ovatis, parce villosis; corolla 6-8 mm longa, tubulosa, dilata ad apicem, parce sericea; tubus staminum includus; filamenta 2.0-2.5 cm longa, antherae dorsifixae, 0.2 mm longae; pistillum 2.5-3.0 cm longum, plurisulcatum, glabrum, sessile, stylus filiformis, stigma capitatum.

Legumen ignotum.

The tiny, sparsely pubescent flowers readily distinguish this species from other species of this series.

Type: Buchtein 3778, from Bolivia.

Specimens cited: Bolivia: Nord Yungas: near Coroico, Buchtein 3778 (US holotype, GH isotype).

INGA CHOCOENSIS Killip ex Elias, sp. nov.

Arbor, cortex cinereus; rami glabri; ramuli teretes, dense ferrugineo-hirsuti. Foliola 2 (-3) juga, 12-30 cm longa, 6-15 cm lata, late elliptica vel late ovata, rotunda vel subcuneata ad basim, brevi-acuminata vel acuta, mucronata, parce pilosa supra, costa dense pilosa, lamina folioli supra basalem glandulam parvam ferens, pilosa subter, nitens supra, opaca subter, subcoriacea, laterales venae 14-20 jugae, conspicue subter; petiolulus 3-4 mm longus, dense ferrugineo-villosus; petiolus 3-4 cm longus, dense pilosus, exparte alata vel alata, ala 4-8 (-12) mm lata, anguste oblonga vel subovata; rhachis 4-6 cm longa, dense pilosa, alata, ala 4-16 mm lata, obovata, parce pilosa supra et subter, venae conspicuae subter; stipulae caducae, 4-6 mm longae, ovatae, acutae vel brevi-acuminatae; glandulae rhachidis 1-2 mm in diametro, orbiculatae, subsessiles, marginibus conspicuis.

Inflorescentiae spicatae, 12-16 mm longae, productis singulatim vel geminatis, terminales vel in superioribus axillis dispositae, 14-20 floribus; bracteae caducae, 3.5-6.0 mm longae, lanceolatae vel anguste ovatae, sericeae; gemmae 3-7 mm longae, oblongae vel obovatae, obtusae vel acutae, parce pilosae; pedunculi 1-2 cm longi, dense pilosi; calyx 6-8 mm longus, sub-campanulatus, dilatus parce ad apicem, parce pilosus, sessilis, lobis 2-4 mm longis, acutis, pilosis; corolla 14-17 mm longa, tubulosa vel dilata ad apicem, sericea, lobis 2-3 mm longis, acutis, sericeis; tubus staminum includus; filamenta alba, 4-5 cm longa, antherae dorsifixae, 0.2-0.5 mm longae; pistillum 4-5 cm longum, ovarium 2.5-3.0 mm longum, bisulcatum, glabrum, stylus filiformis, stigma capitatum.

Legumen subteres, 8-14 cm longum, 1.5-2.0 cm in diametro, sessile, valvis conspicuis, 8-14 mm latis, marginibus sulcatis, dense pilosis.

This species is easily distinguished from all other species of Series Inga by the branchlet and calyx pubescence.

Inga chocoensis has been collected at altitudes of 1-50 m where it occurs infrequently along river banks.

Type: Cuatrecasas 16372, from Colombia.

Specimens cited: Colombia: Choco: Rio San Juan, Palestina, Cuatrecasas 16913 (US). Valle del Cauca: Rio Calima, La Trojita, Cuatrecasas 16372 (COL holotype, F isotype); Rio Calima, between Aquaciaria and La Brea, Cuatrecasas 21169 (US); Rio Cajambre, Cuatrecasas 17643 (US); Rio Yurumanqui, Isla de Golondro and La Amarqura, Cuatrecasas 16035 (US); Rio Naya, Cuatrecasas 14319 (F, US); between El Aquacate and Quebrada de la Yuca, Cuatrecasas 16098 (F).

INGA COCLEENSIS Pittier var. MEGANTHA Elias, var. nov.
Differt ab var. cocleensis calyx 7-10 mm longus, corolla 15-20 mm longa.

This variety is different only in the larger flower size. The calyx in var. megantha is 7-10 mm long, while the corolla measures 15-20 mm long. This variety can be distinguished from I. multijuga by the sulcate legumes.

This variety extends the range of the species into Colombia. Previously I. cocleensis was limited to Guatemala, Nicaragua, and Panama. Both collections of the variety were made at altitudes of 1700-2100 m.

Type: Arbelaez & Cuatrecasas 6458, from Colombia.

Specimens cited: Colombia: El Valle: between Sevilla and Caicedonia, Arbelaez & Cuatrecasas 6458 (US holotype); north of Alban, Dugand & Jaramillo 3021 (US).

INGA MINUTULA (Schery) Elias, stat. nov.
Inga edulis var. minutula Schery, Ann. Mo. Bot. Gard. 37:209. 1950.

This species may be partially or completely winged. Other variations can be found in the shape of the calyx.

Several Colombian and Ecuadorian specimens have had the binomial I. megadenia applied to them by Killip; however, this name was never validly published. The small flower, large leaf-rachis glands, and partially to completely winged rachis place this taxon with the I. oerstediana complex rather than with

I. edulis. Inga cuatrecasasi, another herbarium name of Killip's but never validly published, is synonomous with I. minutula.

Type: Allen 968, from Panama.

Specimens cited:
Guatemala: Escuintla: near Barranco Hondo, Standley 63873 (A).
El Salvador: La Libertad: near Comasagua, Carlson 206 (US).
Honduras: Atlantida: vicinity of Tela, Standley 56617 (US).
Costa Rica: Cartago: Tucurrique, Tonduz 12745 (US); Tres Rios, Leon 1235 (US).
Panama: Bocas Del Toro: Changuinola valley, Dunlap 582 (US, F). Darien: vicinity of El Real, Allen 968 (MO holotype, F, US isotypes). Panama: around Gorgona, Pittier 2696 (NY, F, GH). Canal Zone: Barro Colorado Island, Bangham 395 (US, A), vicinity of Gamboa, Allen 1972 (MO, GH).
Grenada: Annandale, Broadway 3353 (NY); Saint George, Broadway s. n. (GH).
Tobago: without exact locality, Broadway 4659 (MO).
Colombia: Antioquia: Cocorna, Daniel 1188 (US), 2276 (US); Fredonia, Uribe 725 (SIU); San Antonio de Pereira, Daniel 3880 (COL, F). Choco: Palestina, Cuatrecasas 16919 (US); bank of Rio San Juan, near Andagoya, Killip 35394 (US). Cundinamarca: Caparrapi. Garcia-Barriga 7699 (US), Haught 4268 (US). Norte de Santander: El Indio, Cuatrecasas 13131 (US). Valle de Cauca: El Prado, Cuatrecasas 14860 (US, F).
Venezuela: Federal District: around Caracas, Pittier 10425 (US); Macarao, Delgado 317 (US). Tovar: Morida, Alston 7048 (NY, US).
Ecuador: Guayas: Milagro, Hitchcock 20284 (US, GH). Manabi: Santa Domingo to Rio Quininde, Little 6198 (F, US).
Brazil: Ceara: Guaramiranga, Cutler 8156 (MO, NY, US).

INGA SPURIA var. RACEMARIA (Uribe) Elias, stat. nov.
Inga racemaria Uribe, Caldasia 3:355. 1945.
Inga spuria forma racemaria Uribe, Caldasia 5:82. 1948.

This variety differs from var. spuria in the long-pedicellate flowers and the tiny or obscure leaf-rachis glands. This variety is known only from Cali, Colombia.

Type: Uribe 964, from Colombia.

Specimens cited: Colombia: Valle de Cauca: Cali, Uribe 964 (COL holotype, US isotype).

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Bentham, George. 1845. Notes on Mimoseae. Hooker's Jour. Bot. 4:577-622.

PARTIAL REVIEW OF DOTY & MUELLER-DOMBOIS' "ATLAS", AND NEW TAXA IN HAWAIIAN RUBIACEAE

Otto & Isa Degener

In reading Maxwell S. Doty and Dieter Mueller-Dombois' otherwise good "Atlas for Bioecology. Studies in Hawaii Volcanoes National Park," Univ. of Haw. Bot. Sc. Pap. 2: I-507. (June) 1966, our attention was rivetted on Chapter VI, D. In the Table of Contents it is listed as "Flowering Plants and Ferns"; whereas on page 153, as "VASCULAR PLANTS by F. R. Fosberg." Familiar with the area involved since 1922, when the senior reviewer began botanizing there and depositing voucher specimens at the University of Massachusetts, the New York Botanical Garden and numerous other leading botanical institutions, the present checklist in our opinion leaves much to be desired. *Fagerlund and Mitchell in 1944 performed the actual spadework; while the so-called "partial revision," appearing 22 years later, hardly revises!

In the present "revision", Dr. Fosberg's "sensu Hawaiian authors" or "of Hawaiian authors" placed under a binomial he has bettered shows that he is familiar with the botanical literature available during the time he studied at the University of Hawaii several decades ago and, conversely, unfamiliar with modern works by Neal, by the present writers and by more recent monographers. In fact, of the binomials so glibly listed as new for the Hawaiian flora, he might have easily gleaned them by making a few purchases in Honolulu bookshops or by a little study in the library of the Smithsonian Institution of which he is now a staff member. On page 186 under "Grevillea robusta A. Cunn.", he cites as synonym "Stylurus robusta (A. Cunn.) Deg.", evidently not realizing that this latter binomial was published June 30, 1932 before the genus Grevillea was voted a nom. cons. He apparently never realized that this sheet in the "Flora Hawaiiensis" had been replaced by one entitled "Grevillea robusta A. Cunn." on March 15, 1959.

Just to mention a few examples, his lumping four genera of Hymenophyllaceae into Hymenophyllum and Trichomanes, combining Dianella sandwicensis with D. lavarum, uniting the Hawaii species of Pipturus with the Oahu P. albidus, intimating that Portulaca hawaiiensis lacks specific status - such opinions convince us that Dr. Fosberg overemphasizes the likenesses of taxa while minimizing their differences. If he is correct in doing so and not marching backwards, other botanists are terribly out of step.

We believe we are contributing a somewhat better understanding of the genus Gouldia as it is found in Hawaii Volcanoes National Park and elsewhere in the Islands by the following nomenclatural changes:

1. GOULDIA KAALA var. RUSSII (Fosb.) Deg. & Deg. (Syn. G. terminalis var. kaala f. Russii Fosb. in B. P. Bishop Mus. Bull. 147:

49. 1937.) 2. G. OVATA var. HETEROPHYLLA (Fosb.) Deg. & Deg. (Syn. G. term. var. ov. f. heterophylla Fosb. ibid. 52.) 3. G. OVATA var. KALAUPAPA (Fosb.) Deg. & Deg. (Syn. G. t. var. o. f. kalaupapa Fosb. ibid. 51.) 4. G. OVATA var. LYDGATEI (Fosb.) Deg. & Deg. (Syn. G. t. var. o. f. Lydgatei Fosb. ibid. 53.) 5. G. OVATA var. MAKAWAOENSIS (Fosb.) Deg. & Deg. (Syn. G. t. var. o. f. makawaoensis Fosb. ibid. 50.) 6. G. OVATA var. MAUNAHUI (Fosb.) Deg. & Deg. (Syn. G. t. var. o. f. maunahui Fosb. ibid. 51.) 7. G. OVATA var. MEMBRANACEA (Fosb.) Deg. & Deg. (Syn. G. t. var. o. f. membranacea Fosb. ibid. 53.) 8. G. OVATA var. OBOVATA (Fosb.) Deg. & Deg. (Syn. G. t. var. o. f. obovata Fosb. in Bull. Torr. Bot. Cl. 70: 391. 1943.) 9. G. OVATA var. PETIOLATA (Fosb.) Deg. & Deg. (Syn. G. t. var. o. f. petiolata Fosb. in B. P. Bishop Mus. Bull. 147: 53. 1937.) 10. G. OVATA var. PUNAULA (Fosb.) Deg. & Deg. (Syn. G. t. var. o. f. punaula Fosb. ibid. 53.) 11. G. OVATA var. SANTALIFOLIA (Fosb.) Deg. & Deg. (Syn. G. t. var. o. f. santalifolia Fosb. ibid. 51.) 12. G. OVATA var. STOREYI (Fosb.) Deg. & Deg. (Syn. G. t. var. o. f. Storeyi Fosb. ibid. 52.) 13. G. OVATA var. SUEHIROAE (Fosb.) Deg. & Deg. (Syn. G. t. var. o. f. Suehiroae Fosb. ibid. 52.) 14. G. OVATA var. WAILAUENSIS (Fosb.) Deg. & Deg. (Syn. G. t. var. o. f. wailauensis Fosb. ibid. 52.) 15. G. CORDATA var. ACUMINATA (Fosb.) Deg. & Deg. (Syn. G. t. var. cordata f. acuminata Fosb. ibid. 45.) 16. G. CORDATA var. MOLOKAIENSIS (Fosb.) Deg. & Deg. (Syn. G. t. var. cord. f. molokaiensis Fosb. ibid. 45.) 17. G. CORDATA var. NEALAE (Fosb.) Deg. & Deg. (Syn. G. t. var. cord. f. Nealae Fosb. ibid. 45.) 18. G. AXILLARIS var. HAWAIIENSIS (Fosb.) Deg. & Deg. (Syn. G. Hillebrandii var. hawaiiensis Fosb. ibid. 61.) 19. G. AXILLARIS var. NODOSA (Fosb.) Deg. & Deg. (Syn. G. Hillebr. var. nodosa f. eunodosa Fosb. ibid. 61.) 20. G. AXILLARIS var. NODOSA f. LANCIFOLIA (Fosb.) Deg. & Deg. (Syn. G. H. var. n. f. lancifolia Fosb. ibid. 61) 21. G. AXILLARIS f. GLABRIFOLIA (Fosb.) Deg. & Deg. (Syn. G. H. var. typica f. glabrifolia Fosb. ibid. 60.) 22. G. AXILLARIS var. MICROPHYLLA (Fosb.) Deg. & Deg. (Syn. G. H. var. t. f. microphylla Fosb. ibid. 60.).

Among over 60 categories of Dr. Fosberg's putative hybrids may lurk specimens that are true forms and even true varieties without any hybrid admixture; on the contrary, in some of the above putative varieties recognized by us may lurk some nothomorphs developed by recent or more likely ancient hybridization and backcrossings. Hence the monograph by Dr. Fosberg should not lull the collector into thinking that the study of local Gouldiae has been completed. He should continue to gather and study representatives of this genus, whose 2n chromosome number varies from approximately 72 to 105, in the field and attempt to untangle questions of hybridization experimentally rather than by clairvoyance.

Presently home owners on the edge of Hawaii Volcanoes National Park, the reviewers intend to publish an additional "partial review"

of the "Atlas" after more extended field work and after checking the determinations of critical voucher specimens cited.

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*Fagerlund, G. O. & Mitchell, A. L., A checklist of the PLANTS, HAWAII NATIONAL PARK, Kilauea-Mauna Loa Section, with a discussion of the vegetation. Nat. Hist. Bull. 9: 1--75. 1944.

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BOOK REVIEW

Alma L. Moldenke

"Botanical Latin -- History, Grammar, Syntax, Terminology and Vocabulary" by William T. Stearn, xiv & 556 pp., illus., Thomas Nelson & Sons Ltd., Edinburgh, 105 sh., and Hafner Publishing Co., New York City 10003, $16.75. 1966.

What a wonderful service to the field of taxonomic botany now and for many, many years to come has been rendered by this author! Botanical Latin is now and will be required for scientific names, original descriptions and technical terms. Botanical Latin is needed for reading the botanical classics.

It is a living, 300 year old technical language growing out of the tongue of ancient Rome and its Hellenic influences into its own specialized vocabulary and its own standard orthography derived from medieval Latin and being mostly influenced by the "orderly, methodical, systematizing, didactic intellect of Carl Linnaeus." Even some of the eighteenth century terms have undergone changes for "the coining or introduction of new words provides material for the action of linguistic natural selection whereby the most concise, necessary and expressive ones pass into use and the rest perish."

How is it to be learned by coming generations of botanists when so many of our secondary schools no longer teach Latin and when the college classics departments are proportionately shrinking? "To learn it", quotes Stearn from the perhaps overoptimistic A. de Candolle, "was the work of a month for an Italian, two months for a Frenchman, three for an Englishman, and four for a German or Swede." Of all related materials in print only the study of this book could achieve this goal for English readers.

This scholarly work garners between its covers all that the full title includes, plus geographical names, color and chemical reaction terms, abbreviations and symbols, Greek derivations -- all succintly explained. It also includes several model descriptions and diagnoses covering great range in the plant kingdom. The very price of this book will circumvent the plea for writing descriptions in other languages as is permitted by the paleobotanists and zoologists.

Surely the mature taxonomist of today will know of many of Stearn's valuable researches and will therefore expect to find this work a highly advantageous substitute for his stock of school-day Latin grammars and dictionaries. If my husband had not kept borrowing this book from me and if some of my classically trained amateur botanist friends had not become interested in this book, this enthusiastically approving review could have appeared in an earlier issue of this journal! This delay should be interpreted as further confirmation of the great value of "Botanical Latin".

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FURTHER NOVELTIES IN THE VERBENACEAE

Harold N. Moldenke

CITHAREXYLUM PACHYPHYLLUM var. CANESCENS Moldenke, var. nov.

Haec varietas a forma typica speciei foliis dense minutissimeque subincano-puberulis recedit.

This form differs from the typical form of the species in having its leaf-blades and petioles when mature densely subincanous-puberulous with extremely minute hairs.

The type of the variety was collected by Hugh H. and C. Iltis, Donald and V. Ugent (no. 488) in thickets along the road to Yauriviri, at the last point where one can still see Puquio, on more or less cultivated slopes with huge basalt blocks, just above Puquio on the road to Abancay, at an altitude of 3700 meters, Ayacucho, Peru, on December 14, 1962, and is deposited in the H. N. Moldenke herbarium at Plainfield, New Jersey. The collectors describe the plant as a stiff shrub, 2—3 m. tall, the fruits dark reddish-brown or dark burgundy in color.

LANTANA CHIAPASENSIS Moldenke, sp. nov.

Frutex; ramulis dense incano-pubescentibus; petiolis brevibus dense incano-pubescentibus; laminis foliorum ovatis 5—8 cm. longis 2.5—4 cm. latis utrinque dense pubescentibus, ad apicem acutis vel attenuatis, ad basin rotundatis vel subtruncatis plerumque asymmetricis; pedunculis elongatis 3.5—6 cm. longis dense albido-pubescentibus non glanduliferis.

Shrub; branches and branchlets subherbaceous, tetragonal, stramineous, densely incanous-pubescent with simple divergent hairs, the youngest twigs densely hirsutulous-pubescent; nodes annulate; principal internodes elongate, 4.5—9 cm. long; leaves decussate-opposite; petioles short, 5—8 mm. long, densely white-pubescent; leaf-blades membranous, dark-green above, much lighter beneath, distinctly ovate, 5—8 cm. long, 2.5—4 cm. wide, acute or attenuate at the apex, regularly serrate from apex to base, rounded or subtruncate and often asymmetric at the base, sometimes acuminately prolonged into the petiole there, densely short-

pubescent above, extremely and uniformly velutinous-pubescent over the whole surface beneath; inflorescence solitary, axillary, capitate; peduncles rather slender, 3.5—6 cm. long, very densely white-pubescent, the hairs not glanduliferous; heads many-flowered, to about 1.5 cm. wide; outer involucral bractlets lanceolate-elliptic, to 8 mm. long and 2 mm. wide, densely short-pubescent on both surfaces, attenuate at the apex.

The type of this species was collected by Keith Roe, Eunice Roe, and Scott Mori (no. 999) in cutover secondary growth woodland on a steep sandy and clay slope with Agave, Hernandea sonora, Clusia rosea, and Psittacanthus schiedeanus, in tropical deciduous vegetation 4 km. southwest of Las Rosas on the road to Venustiano Carranza, at an altitude of 900 meters (16°20' N; 92° 30' W), Chiapas, Mexico, on August 8, 1965, and is deposited in the H. N. Moldenke herbarium at Plainfield, New Jersey.

LIPPIA HYPOLEIA var. OVATIFOLIA Moldenke, var. nov.

Haec varietas a forma typica speciei laminis foliorum distincte ovatis recedit.

This variety differs from the typical form of the species in having its leaf-blades distinctly and uniformly ovate.

The type of the variety was collected by Keith Roe, Eunice Roe, and Scott Mori (no. 1121) in scrubby Quercus woodland on a rocky hillside with Acacia and Agave, on highway 195 south of Bochil, 33 km. (by road) north of the junction of highways 190 and 195, at an altitude of about 1500 meters (16°50' N; 92°55' W), in the highlands of Chiapas, Mexico, on August 10, 1965, and is deposited in the H. N. Moldenke herbarium at Plainfield, New Jersey. The collectors describe the plant as a shrub, 1.5 m. tall, with white and yellow flowers.

LIPPIA ROSMARINIFOLIA var. LATIFOLIA Moldenke, var. nov.

Haec varietas a froma typica speciei foliis anguste ellipticis usque ad 7 mm. latis recedit.

This variety differs from the typical form of the species in having its leaf-blades narrow-elliptic and to 7 mm. wide.

The type of the variety was collected by Alban Stewart (no. 3309) on James Island, Galapagos Islands, on December 26, 1905, and is deposited in the herbarium of the California Academy of Sciences in San Francisco.

LANTANA FRUTILLA var. OBTUSIFOLIA Moldenke, var. nov.

Haec varietas a forma typica speciei laminis foliorum obtusis vel obtusiusculis recedit.

This variety differs from the typical form of the species in having its leaf-blades obtuse or subobtuse at the apex.

The type of this variety was collected by Keith Roe, Eunice Roe, and Scott Mori (no. 680) in open disturbed secondary-growth thickets in a disturbed semi-deciduous forest with scattered Quercus and large ferns, along the cool moist Pacific escarpment

8 km. south of Quezaltenango on highway 9s, near the hydroelectric plant 1/2 km. north of Zunil, at an altitude of about 2075 m., Quezaltenango, Guatemala, on July 31, 1965 (14°45' N; 91°30' W), and is deposited in the H. N. Moldenke herbarium at Plainfield, New Jersey. The collectors describe the plant as a shrub, 1.5 m. tall, with a pungent odor and with white flowers.

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ADDITIONAL MATERIALS TOWARD A MONOGRAPH OF THE GENUS CALLICARPA. VI

Harold N. Moldenke

CALLICARPA L.

Additional & emended bibliography: Sieb., Jaarb. Konink. Nederl. Maatsch. Tuinb. [Ann. Hort. Pays-Bas] 1844: 25. 1844; Lindl. & Paxt. in Paxt., Flow. Gard. 2: 165--166, fig. 221. 1853; Scheffer, Ann. Jard. Bot. Buitenz. 1: 41. 1876; P. Henderson, Hand. Pl., ed. 1, 34--35. 1881; Regel, Gartenfl. 30: 42. 1881; Lefroy, Bull. U. S. Nat. Mus. 25: 97. 1884; "B.", Gard. Illustr. 9: 323. 1887; J. Matsum., Bot. Mag. Tokyo 3: 115 & 318. 1889; P. Henderson, Handb. Pl., ed. 2, 64. 1890; K. Schum. & Warb., Notizbl. Bot. Gart. Berlin 2: 144. 1898; "X.", Gard. Illustr. 24: 633--634. 1903; Hattori, Journ. Coll. Sci. Univ. Tokyo 23 (10): 34. 1908; King & Gamble, Journ. Roy. Asiat. Soc. Bengal 74 (2), extra no. 794 & 801--808. 1908; King & Gamble, Mat. Fl. Malay. Penins. 21: 1011--1018. 1909; P. Henderson, Handb. Pl., ed. 3, 65. 1910; C. K. Schneid., Illust. Handb. Laubholzk. 587 & 591--594, fig. 384 c--i & 385 b--l. 1911; Bakh. in Lam & Bakh., Bull. Jard. Bot. Buitenz., ser. 3, 3: [1], 3, 9--27, [106]--108, & Addit. [I]. 1921; E. D. Merr., Enum. Philip. Flow. Pl. 382--389. 1923; Nakai, Fl. Sylv. Kor. 14: 27--33 & 133, pl. 5--9. 1923; Gamble, Fl. Presid. Madras 1085 & 1091--1092. 1924; Metc., Lingnan Sci. Journ. 11: 405--408. 1932; Suzuki, Trans. Nat. Hist. Soc. Formos. 25: 130--131. 1935; Sugiura, Cytologia 7: 544. 1936; Yamamoto, Journ. Soc. Trop. Agr. 10: 277. 1938; Koidz. in Shirasawa, Icon. Essenc. Forest. Jap. 2: fig. 2487 & 2488. 1938; A. W. Hill, Ind. Kew. Suppl. 9: 45--46. 1938; Nakai, Journ. Jap. Bot. 14: 639--641. 1938; Fletcher, Kew Bull. Misc. Inf. 1938: 199, 409, & 411--415. 1938; Merr. & Chun, Sunyatsenia 5: 178--179, pl. 27. 1940; Masamune, Trans. Nat. Hist. Soc. Formos. 30: 63--64. 1940; Van Melle, Journ. N. Y. Bot. Gard. 43: 36 & 42. 1942; E. J. Salisb., Ind. Kew. Suppl. 10: 38. 1947; Rehd., Bibl. Cult. Trees 583--584. 1949; W. J. Bean in Chittenden, Roy. Hort. Soc. Dict. Gard. 1: 358--359. 1951; Darlington & Wylie, Chromosome Atl., pr. 1, 323 & 503. 1955; Satyanarayan, Proc. Sympos. Humid Trop. Veg. 201 & 207. 1958; J. Hutchinson, Fam. Flow. Pl., ed. 2, 2: 395. 1959; Anon., Kew Bull. Gen. Index 1929-1956, 59. 1959; Satyanarayan, Sympos Impact Man Humid Trop. Veg. 229. 1960; Darlington & Wylie, Chromosome Atl., pr. 2, 323 & 503. 1961;

Runner, Rep. G. W. Groff Coll. 362. 1961; Hanelt, Kulturpfl. 11: 224. 1963; Quisumb., Govt. Sarawak Sympos. Ecol. Res. Humid Trop. Veg. 34. 1965; Harvill, Rhodora 67: 394. 1965; Moldenke, Phytologia 13: 466—506 & 508 (1966) and 14: 36—63, 99—128, & 140—192. 1966; Stearn, Botan. Latin 264. 1966.

Bean (1951) says of the members of this genus "They love the sunshine and thrive in good loamy soil. Easily increased by softish cuttings with gentle bottom heat, and by seed. It has been found, with some species at any rate, that better crops of fruit are borne when several plants are closely associated -- a common occurrence, however, with fruit-bearing shrubs."

Yamamoto (1938) has described a mint, Taitonia callicarpoides Yamamoto, from Formosa, which he says has much the aspect of a species of Callicarpa.

CALLICARPA ACULEOLATA Schau.

Additional bibliography: E. J. Salisb., Ind. Kew. Suppl. 10: 38. 1947; Moldenke, Phytologia 13: 430—431. 1966.

CALLICARPA ACUMINATA H.B.K.

Additional bibliography: Sieb. & Zucc., Abhandl. Math.-phys. Cl. König. Baier. Akad. Wiss. München 4 (3): 156. 1846; Moldenke, Phytologia 13: 466 & 475 (1966) and 14: 142. 1966.

Recent collectors describe this plant as a shrub and found it growing in the remains of rainforests highly disturbed by cutting and burning and now mostly secondary growth thickets. The flowers are described as "white" on Roe, Roe, & Mori 1353.

According to Siebold & Zuccarini (1846) Hasskarl claims that C. acuminata H.B.K. was introduced into Java from Japan! It seems most probable, however, that he is referring here to C. acuminata Roxb., a synonymous designation for what we now call C. mudiflora Hook. & Arn.

Additional citations: MEXICO: Hidalgo: H. E.Moore Jr. 3392 (Ws). Quintana Roo: Roe, Roe, & Mori 1339 (Ac), 1353 (Rf). Vera Cruz: Cavender s.n. [Alazam, Dec. 19, 1963] (Ws).

CALLICARPA ACUTIDENS Schau.

Additional bibliography: A. W. Hill, Ind. Kew. Suppl. 9: 45. 1938; Moldenke, Phytologia 13: 466—467 (1966) and 14: 142. 1966.

CALLICARPA AMERICANA L.

Additional bibliography: Thunb., Nov. Act. Reg. Soc. Sci. Upsal. 4: 31. 1783; P. Henderson, Handb. Pl., ed. 1, 34—35. 1881; O. A. Reade, Pl. Bermud. 62. 1883; Lefroy, Bull. U. S. Nat. Mus. 25: 97. 1884; P. Henderson, Handb. Pl., ed. 2, 64 (1890) and ed. 3, 65. 1910; H. B. Small, Bot. Bermud. 48—49. 1913; Harvill, Rhodora 67: 394. 1965; Moldenke, Phytologia 13: 467—497 & 502 (1966) and 14: 37, 53, 57, 107, 111—113, 115, 118, 126, 167, 186, & 191. 1966.

Brown thrashers are said to enjoy feeding in these fruits in the southeastern United States. The plant is misidentified as C. ferruginea Sw. by O. A. Reade (1883), Lefroy (1884), and H. B.

Small (1913), but the "C. americana L." of Thunberg (1783) is really C. japonica Thunb.

Additional citations: LOCALITY OF COLLECTION UNDETERMINED: Herb. F. J. Young s.n. [ex N. America] (Ws).

CALLICARPA ANGUSTA Schau.

Additional bibliography: Moldenke, Phytologia 13: 498--500. 1966.

Merrill (1912) cites, in addition, an unnumbered Hallier collection from Luzon.

The Ahern 811Q, distributed as C. angusta, is actually C. formosana Rolfe, while Kollmann s.n. [Java, 1838] is C. longifolia Lam.

CALLICARPA ANGUSTIFOLIA King & Gamble

Additional bibliography: Fletcher, Kew Bull. Misc. Inf. 1938: 412 & 413. 1938; Anon., Kew Bull. Gen. Index 1929-1956, 59. 1959; Moldenke, Phytologia 13: 500—501. 1966.

CALLICARPA ARBOREA Roxb.

Additional bibliography: H. N. Ridl., Journ. Fed. Malay States Mus. 10: 110 & 150. 1920; Fletcher, Kew Bull. Misc. Inf. 1938: 411--413. 1938; Anon., Kew Bull. Gen. Index 1929-1956, 59. 1959; Moldenke, Phytologia 13: 501—506 (1966) and 14: 36--42, 107, & 111. 1966.

Fletcher (1938) places C. villosissima Ridl. in the synonymy of C. arborea. He places C. villosa Roxb. and C. lanata H. J. Lam in the synonymy of what he calls C. arborea var. villosa. I regard Lam's name as applying to C. arborea var. psilocalyx (H. J. Lam) Moldenke.

The W. T. Tsang 23914, distributed as C. arborea and so cited by me in Phytologia 14: 39 (1966), is actually C. integerrima Champ.

CALLICARPA BICOLOR A. L. Juss.

Additional bibliography: Moldenke, Phytologia 14: 46—49, 108, 111, 112, 114, 121, 179, 183, & 191. 1966.

The P. T. Barnes s.n. [Herb. Philip. Forest. Bur. 55], distributed as C. bicolor, is actually C. formosana Rolfe.

CALLICARPA BODINIERI Léveillé

Additional & emended bibliography: Moldenke, Known Geogr. Distrib. Verbenac., ed. 1, 56, 71, 86, & 87. 1942; Moldenke, Résumé 167, 168, 174, 213, 241, 243—245, 247, 443, & 444. 1959; Moldenke, Phytologia 14: 49—62 & 167. 1966.

CALLICARPA BODINIERI var. GIRALDII (Hesse) Rehd.

Additional synonymy: Callicarpa arnoldiana Hort. ex Moldenke in Fedde, Repert. Spec. Nov. 40: 88, in syn. 1936.

Additional bibliography: Metc., Lingnan Sci. Journ. 11: 407.

1932; L. H. & E. Z. Bailey, Hortus Suppl. 670. 1935; A. W. Hill, Ind. Kew. Suppl. 9: 45. 1938; E. J. Salisb., Ind. Kew. Suppl. 10: 38. 1947; Moldenke, Phytologia 14: 50—60, 62, 99, 102, 127, & 167. 1966.

The Baileys (1935) and Salisbury (1947) regard C. arnoldiana Hort. as a synonym of C. japonica Thunb., as I also did in my 1936 work. It seems to me now, however, that this name belongs more likely in the synonymy of C. bodinieri var. giraldii, a taxon with whose introduction into American gardens the Arnold Arboretum was so closely associated.

The Tsang 850 [Herb. Lingnan Univ. 16349], distributed as this variety, is actually C. formosana Rolfe.

CALLICARPA BRACTEATA Dop

Additional bibliography: A. W. Hill, Ind. Kew. Suppl. 9: 45. 1938; Moldenke, Phytologia 14: 63 & 99. 1966.

CALLICARPA BREVIPES (Benth.) Hance

Additional bibliography: Moldenke, Phytologia 14: 55, 58, 99—104, 106, 147, & 148. 1966.

CALLICARPA BREVIPES f. ANNAMENSIS Moldenke

Additional bibliography: Moldenke, Phytologia 14: 102 & 103. 1966.

CALLICARPA BREVIPETIOLATA Merr.

Additional bibliography: Moldenke, Phytologia 14: 102, 104—106. & 121. 1966.

CALLICARPA BUCHERI Moldenke

Additional bibliography: E. J. Salisb., Ind. Kew. Suppl. 10: 38. 1947; Moldenke, Phytologia 14: 106—107. 1966.

CALLICARPA CANDICANS (Burm. f.) Hochr.

Additional synonymy: Callicarpa cana var. typica Bakh. ex Fletcher, Kew Bull. Misc. Inf. 1938: 413. 1938.

Additional bibliography: Fletcher, Kew Bull. Misc. Inf. 1938: 412—414. 1938; A. W. Hill, Ind. Kew. Suppl. 9: 45 & 46. 1938; Moldenke, Phytologia 14: 37, 46, 48, 59, 107—128, 140, 142, 174, 175, 178, 179, 182, 183, & 191. 1966.

The Ahern 156Q, A. Castillo s.n. [College campus, January 3, 1931], and Quisumbing 2281, distributed as this species, are all actually C. formosana Rolfe.

CALLICARPA CANDICANS var. SUMATRANA (Miq.) Moldenke

Additional bibliography: Moldenke, Phytologia 14: 59, 112, 119, 121, 122, 125—128, & 140. 1966.

CALLICARPA CAUDATA Maxim.

Additional bibliography: Moldenke, Phytologia 14: 140—144 & 170—173. 1966.

The R. S. Williams 1158, distributed as this species, is actually C. formosana f. angustata Moldenke.

CALLICARPA CRASSINERVIS Urb.

Additional synonymy: Callicarpa rugifolia C. Wright ex E. J. Salisb., Ind. Kew. Suppl. 10: 38, in syn. 1947.

Additional bibliography: E. J. Salisb., Ind. Kew. Suppl. 10: 38. 1947; Moldenke, Phytologia 14: 148--149. 1966.

CALLICARPA CUNEIFOLIA Britton & P. Wils.

Additional bibliography: Moldenke, Phytologia 14: 155. 1966.

The Morton & Alain 9122 cited by me as C. fulva A. Rich. has much of the aspect of C. cuneifolia and may represent a hybrid between these two taxa.

CALLICARPA DICHOTOMA (Lour.) K. Koch

Emended synonymy: Callicarpa purpurea A. L. Juss., Ann. Mus. Hist. Nat. Paris 7: 67. 1806 [not C. purpurea Hort. ex Lem., 1859, nor Hort. ex Moldenke, 1941, nor Nakai, 1923, nor Van Houtte, 1932].

Additional & emended bibliography: Miq., Cat. Mus. Bot. Lugd.-Bat. 70. 1870; H. N. Ridl., Journ. Fed. Malay States Mus. 10: 150. 1920; Nakai, Fl. Sylv. Kor. 14: 28--30 & 133, pl. 5. 1923; Metc., Lingnan Sci. Journ. 11: 407. 1932; A. W. Hill, Ind. Kew. Suppl. 9: 45 & 46. 1938; Moldenke, Phytologia 14: 156--170, 173, 174, 184, & 186. 1966.

The C. purpurea Nakai, referred to above, is a synonym of C. japonica Thunb., that ascribed to "Hort. ex Moldenke" is C. longifolia Lam., and that ascribed to "Hort. ex Lem." and to Van Houtte is C. rubella Lindl.

The Chiao 1612 [Herb. Univ. Nanking 18601], Sawada s.n. [17. VII.1926], and Takamatsu 1635, distributed as C. dichotoma, are all actually C. japonica Thunb.

Miquel (1870) cites 4 unnumbered Siebold specimens, 3 Bürger specimens, 2 Mohnike specimens, and 1 Maximowicz specimen from Japan.

CALLICARPA ELEGANS Hayek

Additional bibliography: A. W. Hill, Ind. Kew. Suppl. 9: 46. 1938; Moldenke, Phytologia 14: 172--175. 1966.

CALLICARPA ERIOCLONA var. PAUCINERVIA (Merr.) Moldenke

Additional bibliography: Moldenke, Phytologia 14: 174, 179, & 182--184. 1966.

CALLICARPA FERRUGINEA Sw.

Additional bibliography: Moldenke, Phytologia 14: 155, 167, & 185--187. 1966.

The Alain & Morton 5078 and C. Wright 430 [1860], distributed as this species, are actually C. fulva A. Rich.

CALLICARPA FORMOSANA Rolfe

Additional bibliography: Metc., Lingnan Sci. Journ. 11: 407 & 408. 1932; Suzuki, Trans. Nat. Hist. Soc. Formos. 25: 130. 1935; E. J. Salisb., Ind. Kew. Suppl. 10: 38. 1947; Moldenke, Phytologia 14: 142, 167, 173, 174, & 187--192. 1966.

Matsuda's original description (1913) of C. ningpoensis continues as follows: "According to Hemsley this is the case with C. formosana Rolfe, C. japonica Thunb., C. longifolia Lam., and C. purpurea Juss., all of which are closely allied. My plant is allied to the species of this group, but as I can not satisfactorily identify it with any of them, I have to propose a new name."

Handel-Mazzetti's original description (1922) of C. aspera is: "Frutex 1.7 m. ramis petiolis inflorescentiis pilis brevissimis dendroideis brunneis hirto-velutinis. Folia elliptica 11--13 cm. lg. 6--7 cm. lt. paulum acuminata basi obtusa, crebre repando-denticulata, crasse herbacea subtus paulo pallidiora supra setulis simplicibus subtus etiam stellatis et dendroideis asprella et hic mimute aureo-glandulosa et lepidibus maioribus spadiceis membranaceis scutellatis sparsis induta; costa nervique 9--12 ni oblique ante marginem anastomosantes et venulae laxiusculae supra temissime subtus argute promimuli; petiolus 9--12 cm. lg. crassus supra anguste salcatus. Corymbi supra gemmas axillares, pedunculis crassiusculis 3 cm. lgis. 15--18 mm. supra basin ter vel quater dichotomis, densissimi 3--4.5 cm. diam. Bracteae minutae subulatae. Pedicelli 1--1.5 mm. lg. temues. Calyx ad 1 mm. lg. ad 12 in lobos semiorbiculares fissus pilis fasciculatis asper. Bacca 2 mm. diam. viridiflava. Prov. Kwangtung. Sept.; Ad vias montis Lunghaotung montium Lungtou-schan, 900 m.?, leg. cur. 18. IX. 1917 Mell (Nr. 920). Calycis lobis praeter indumentum ceteraque insignis."

Lam's description (1919) of C. blancoi follows: "A shrub with tomentose texture on innovations, cymes and petioles; leaves opposite, membranous, ovate or oblong-ovate, base acute or somewhat rounded to truncate, margins more or less irregularly crenato-dentate; nerves, not very distinct, 7--9 pairs; 5 1/2 — 9 cM. long, 2.2--5 cM. wide, petioles 0.5--1 cM.; texture varying on upper side, from stellate-hairy in youth, and glabrous when adult, to a covering with simple hairs, which are densier on the midrib and on lower side, from yellowy stellate-tomentose to almost glabrous; cymes on short peduncles, 1.3--2.5 cM. long and wide; peduncles 0.7--2 cM.; calyx 4-toothed, more or less stellate-hairy, glandular, 0.1 cM.; corolla glabrous with 4 short, glabrous or somewhat hairy, lobes, and 4 lines of little glands, 0.25--0.3 cM.; stamens exserted, anthers glandular on both sides, filaments 0.5 cM.; style 0.6 cM.; ovary glandular; fruits globose, 0.15--0.3 cM. in diam., glabrous.....Distrib.: Philippine Islands!, Banda.? The species has an affinity with C. cana, but the simple hairs sometimes present on the upper side of its leaves, and the peduncles, which are generally longer than the petioles, form differences, which, with the different form of the leaves, separate it from that species." He cites Teijsmann s.n. (Le--

908.265-307) from Banda with a question, and Lilles 42 and C. B. Robinson 9695 from Luzon and Elmer 10985 & 13441 from Mindanao. He keeps C. formosana Rolfe separate from C. blancoi in his key and text, but makes the comment "There were no specimina of this species within our reach, but from the descriptions we should say that it is identical with C. Blancoi."

P'ei (1932) sums it all up in the following statement: "Distribution: Formosa and the Philippines, its other distribution in Malaysia uncertain. Callicarpa formosana Rolfe differs from its allies by its longer peduncle and the harsh character of its leaves. A shrub densely pubescent with stellate hairs. Leaves ovate, serrate, base cuneate or sometimes somewhat rounded, apex acuminate, usually 6 to 15 cm. long, 2.5 to 7 cm. wide, the upper surface rough due to falling off of the stellate hairs, glandular and densely pubescent beneath; glands shining, yellow; petioles about 1 cm. or more in length; lateral nerves 5 to 9 on each side of the midrib. Flowers pedicelled; pedicels about 1.5 mm. in length. Peduncles 1.5 to 2.5 cm. long. Calyx small, less than 1 mm. in length, densely pubescent and glandular with stellate hairs without, glabrous within. Corolla-lobes wide spreading about 2 mm. in diameter, sparsely pubescent and glandular without. Stamens 4, equal, exserted; anthers oblong, 6 mm. in length. Style exserted. Ovary glandular. Fruit globose, 2 mm. in diameter." he cites the following specimens: CHINA: Chekiang: Chiao 828, Ching 1838, Keng 141. Fukien: Chang & Metcalf 197 & 216, Cheng 103-1 & 1439, Chung 1204, 2145, 2314, 3021, 3795, & 6677, En 2607, Fong 212 & 218, Ging 5326 & 6766, Po 12120, and Tai 11793. Kiangsu: Au 905. Kwangtung: Chun 5706, 5707, 5715, 5828, & 7555, Herb. Canton Chr. Coll. 32, Mell 920 (A), E. D. Merrill 10838, Peng s.n. [Shiu chow region, April 1919], Peng, Tak, & Kin 9, Tak & Chow 2221 & 2434, Tsiang 2158, Tso 20315, and Ying 1342. CHINESE COASTAL ISLANDS: Lantau: Chun 4874. HONGKONG: Chun 5147 and Ying 347.

Henry (1896) reports the species from Lambay Island. Matsumura (1899) cites Hiraoka s.n. [Shinchiku], Kawai s.n., Makino s.n. [Kelung, Pikoh, Shalyootoo, Taipe], Owatari s.n. [Panlyau & Tooseikaku], and Yokoyama s.n. [Nanshoo] from Formosa. Matsumura & Hayata (1906) cite, also from Formosa, Faurie 304, Hiraoka s.n. [Shintiku], Makino s.n. [Kelung, Sharyōtō, Hikaku, 1896], Miyaki s.n. [Kōtōshō et Giranchō; Tensonhi, XI.1899], Miyaki s.n. [Kusshaku et Shintengai, 1899], Yano s.n. [in monte Taiton, Mart. 1897], and Yokoyama 48. Li (1963) cites, also from Formosa, Chen s.n., Faurie 305, 393, 395, & 8019, Gressitt 6, Hayata & al. s.n., A. Henry 78, 287, 435, 741, & 1947, Ito s.n., Kanehira 21154, Keng 1021, Mori & Sai s.n., Morimoto & Hayashi s.n., Oldham 388 & 389, Price 237, Sasaki 21435, Tanaka 89, Tanaka & Shimada 10988, Watters 82, Wilford 493, and E. H. Wilson 9934, 10235, 10770, 11012, & 11141, as well as A. Henry 1048 from Lambay Island and Tanaka

10397 from Lanyu Island.

Material of C. formosana has been misidentified and distributed in herbaria under the names C. angusta Schua., C. bicolor A. L. Juss., C. cana L., C. dichotoma (Lour.) K. Koch, C. giraldiana Hesse, C. giraldiana Pamp., C. japonica Thunb., C. macrophylla Vahl, C. micrantha Vidal, C. pedunculata R. Br., C. reevesii Wall., C. reveesi Wall., C. siongsaiensis Metc., C. tomentosa Willd., and even Phyllanthus sp.

On the other hand, the Lizardo 30, McClure 3038 [Herb. Canton Chr. Coll. 9591], and Tsang 21989, distributed as C. formosana, are actually f. albiflora Yamamoto; Keng & Kao K.1273, E. D. Merrill 1718, and E. H. Wilson 9934 & 11141 are f. angustata Moldenke; M. Ramos s.n. [Herb. Philip. Bur. Sci. 46442] and Ramos & Edaño s.n. [Herb. Philip. Bur. Sci. 45203 & 47223] are var. glabrescens Moldenke; W. Y. Chun 5828 is the type collection of var. chinensis P'ei; Ching 5922 and Tai 11793 are C. bodinieri var. giraldii (Hesse) Rehd.; M. S. Clemens 16800 & 17073 are C. elegans Hayek; and Ching 5922 is C. rubella Lindl. [a cotype collection of C. rubella f. crenata P'ei].

In all, 294 herbarium specimens and 5 mounted photographs, including type or phototype material of some of the names involved, have been examined by me.

Additional citations: CHINA: Chekiang: Chiao 828 [Herb. Univ. Nanking 14128] (Ca—325125, W—1426628), 1838 (W—1246706), 14128 (Go, N); R. C. Ching 1838 (Ca—281204, S). Fukien: T. C. Chang 197 (Vi), 4645 (Du—200031); Chang & Metcalf 197 (Ca—249096), 216 (Ca—249173); C. H. Cheng 1031 (Ca—286996), 1088 (Ca—286958), 1298 (Ca—563676), 1418 (Ca—563776), 1439 (Ca—286958), 3004 (Bz—17602); H. H. Chung 881 (Ph), 1204 (Ca—224680), 2145 (Bz—18168), 2314 (Ca—232945), 2677 (Ca—232857), 3021 (Ca—243634, Ca—420297), 7727 (N), 7865 (N), 8284 (N); En 2607 (Ca—299582); Fong 212 (Ca—300065), 218 (Ca—300042); Ging 5326 (Ca—322196), 5838 (Mi), 6766 (Ca—322328); Po 12120 (Ca—325772, Um—84). Kiangsi: S. K. Lau 3924 (S, W—1752677, W—1941418), 4469 (S, W—1753137). Kwangsi: W. T. Tsang 23820 (N), 24642 (N). Kwangtung: Herb. Canton Chr. Coll. 12008 (S, W—1247385); S. K. Lau 696 (N); C. O. Levine s.n. [Herb. Canton Chr. Coll. 32] (W—778523); Mell 920 (N—photo); E. D. Merrill 10838 (Ca—300797, Gg—31973, Gg—237836); P'eng & Groff 2802 (Gg—31972, N), s.n. [Herb. Canton Chr. Coll. 2802] (Ca—301022); Peng, Tak, & Kin 9 [Herb. Canton Chr. Coll. 12008] (Ca—274877); Sin 9804 (N); Tak & Chow 2434 [Herb. Canton Chr. Coll. 14295] (Ca—318962), 2821 [Herb. Canton Chr. Coll. 14682] (Ca—319357); To & Tsang 12008 (N); W. T. Tsang 20496 (Ba, Bz—17599, W—1753685), 20596 (Ca—611373, N), 21152

(Ca—11185, I, N, N, S), 21388 (Bz—17601, Ca—11246, I, N, N, S), 21586 (Bz—17600, Ca—11127, I, N, N, S); Tsiang 2158 (N); Tso 20315 (N), 21315 (N), 21460 (N); Tsui 118 (W—1754503), 119 (Ba, Bz—17598, N), 211 (N, W—1754555), 613 (Ba, N, W—1754765); Ying 1342 (Ca—360133, W—1513175), 2158 (Bz—18166, Bz—18167). Province undetermined: Gaudichaud s.n. [Chine, juillet 1839] (Du—166511). CHINESE COASTAL ISLANDS: Hainan: Chun & Tso 44757 (B, N); Gressitt 721 (I); S. K. Lau 96 (B, Ca—525179, I, Mi, N, W—1629076), 3706 (Bi, S); W. T. Tsang 850 [Herb. Lingnan Univ. 16349] (N, S); Wang 33688 (N). Lantau: W. Y. Chun 4874 (Ca—357970, Ca—374136). HONGKONG: N. K. Chun 40774 (Gg—237830); W. Y. Chun 5147 (Ca—357918); Ying 347 (Ca—358380). WESTERN PACIFIC ISLANDS: FORMOSA: Cheun & al. s.n. [April 13, 1961] (Lb—48707); Faurie 305 (Du—14020, V—8254); Gressitt 6 (N), 215 (N); Hayata, Kanehira, & Tanaka 283 (Ca—345488); A. Henry 435 (N, W—455346), 741 (N, W—455423), 1048 (N), 1947 (N, N); Hosokawa 9905 (Bi); Kanehira 21154 (Ca—344599); Keng K.1021 (W—2035741); Kuntz 028 (W—2336832); L. L. Liu s.n. [April 10, 1961] (Lb—49424, Mi); Mori s.n. [Aug. 10, 1936] (W—2063359); H. W. Ream s.n. [May 14, 1958] (Ws); Sasaki 21435 (Ca—344430, N), s.n. [Herb. Govt. Formosa 20962] (W—photo), s.n. [Herb. Govt. Formosa 21435] (La, W—1372498); T. Tanaka 89 (La, S, W—1528108), 10397 (Ca—477015, N), 10988 (N); Tanaka & Shimada 10988 (B, B, Go, La, Mi, S, W—1577461); E. H. Wilson 10770 (Ph, W—1053010), 10850 (W—1053033); Yamamoto 2387 (N). PHILIPPINE ISLANDS: Babuyan: R. C. McGregor s.n. [Herb. Philip. Bur. Sci. 10108] (Bi). Batan: M. Ramos s.n. [Herb. Philip. Bur. Sci. 80655] (Bz—17597). Bohol: R. C. McGregor s.n. [Herb. Philip. Bur. Sci. 1239] (Bz—18136, N); M. Ramos s.n. [Herb. Philip. Bur. Sci. 42808 (Ca—242440), s.n. [Herb. Philip. Bur. Sci. 43346] (Ca—242441). Catanduanes: Ramos & Edaño s.n. [Herb. Philip. Bur. Sci. 75187] (N), s.n. [Herb. Philip. Bur. Sci. 75283] (Ca—449260, N). Dinagat: Ramos & Pascasio s.n. [Herb. Philip. Bur. Sci. 35239] (Ca—212252). Leyte: Elmer 7366 (Bz—18149, N); Glassman 427 (Ur), 476 (Ur), 579 (Ur); Kruckeberg & Brown s.n. [Vic. of Abuyog, September 9, 1945] (N). Luzon: Ahern 156Q (Bz—18156), 198Q (Bz—18155), 811Q (Bz—18154); Bacani s.n. [Herb. Philip. Forest. Bur. 16674] (Bz—18146); P. T. Barnes s.n. [Herb. Philip. Forest. Bur. 55] (Bz—18152, N); Bartolomé 34 (Mi); Buen s.n. [Herb. Philip. Forest. Bur. 29136] (Ca—268042, S); M. S. Clemens 5881 (Ca—252508), 7212 (Ca—274174), 17400 (Ca—304358, N), s.n. [Iligan, Dec. 22, 1923] (Ca—244061); Edaño s.n. [Herb. Philip. Bur. Sci. 48766] (Ca—321810, N); Elmer 5629 (Bz—18141, N), 8151 (Bz—18144, N), 14352 (Bz—18132, Ca—272332, N, S, Ut—67399), 17611 (Bz—18133, Ca—271431, N, S, Ut—67247), 22211 (Bz—17293, Ca—

7817, N); Fénix s.n. [Herb. Philip. Bur. Sci. 12642] (Cm); F. C. Gates 5270 (Ws), 6286 (Ka--64615), 6600 (Mi); Haenke 79 (Ca--280936); Juliano 9 (Ca--308171); Lete 87 (Ca--304811); Lizardo s. n. [Herb. Philip. Forest. Bur. 29935] (Ca--268043, N); Loher s.n. [Rizal province] (Ca--229195); Madrid s.n. [San Quintin, Sept. 1925] (Ca--291946); R. C. McGregor s.n. [Herb. Philip. Bur. Sci. 11307] (Cm); E. D. Merrill 145 (Bz--18153), 2522 (N), 2688 (N), Sp. Blanc. 637 (Bz--18134, N); R. Meyer s.n. [Herb. Philip. Forest. Bur. 2520] (Bz--18145, N, Po--64815); Paraiso s.n. [Herb. Philip. Forest. Bur. 30917] (N); Quisumbing 2281 (Ok--17136), 7884 (Mi); M. Ramos 1863 (Bz--18131, N), s.n. [Herb. Philip. Bur. Sci. 13281] (Bz--18142), s.n. [Herb. Philip. Bur. Sci. 13950] (Cm), s.n. [Herb. Philip. Bur. Sci. 33019] (N); Ramos & Edaño s. n. [Herb. Philip. Bur. Sci. 29051] (Bz--18130), s.n. [Herb. Philip. Bur. Sci. 44573] (Ca--257639, N), s.n. [Herb. Philip. Bur. Sci. 44745] (Bz--18137, Ca--257640, N, S), s.n. [Herb. Philip. Bur. Sci. 45067] (Bz--18139, Ca--257641, N), s.n. [Herb. Philip. Bur. Sci. 45203] (N), s.n. [Herb. Philip. Bur. Sci. 75712] (Ca--449195, N); C. B. Robinson s.n. [Herb. Philip. Bur. Sci. 6808] (Bz--18143); F. L. Stevens 225 (Ur), 537 (Ur); Vanoverbergh 17743 (Ca--359365); Weiss 3630 (Bz--18157); Whitford 404 (N); R. S. Williams 115 (N). Masbate: E. D. Merrill 3375 (N). Mindanao: Ahern 6620 (Bz--18151); M. S. Clemens 190 (W--619268); Elmer 10985 (Bi, Bz--18150, N, Ut--27643, Vt), 13441 (Bi, Bz--18148, Ca--272084, N, Ut--33524); Fénix s.n. [Herb. Philip. Bur. Sci. 26058] (Ca--238490); C. M. Weber 1055 (Ca--239439, Cm); R. S. Williams 2577 (N, N). Mindoro: Abaca 1 [Herb. Philip. Forest. Bur. 29933] (Ca--268044); Conklin 186 [Philip. Nat. Herb. 17535] (Mi); Kienholz 327 [Herb. Philip. Bur. Sci. 15310] (Ca--263014), 344 [Herb. Philip. Bur. Sci. 15324] (Ca--263008); Mangubert s.n. [Herb. Philip. Bur. Sci. 937] (Mi--photo, N); R. C. McGregor 113 (N); E. D. Merrill 892 (N, W--435860), 1214 (N); M. Ramos s.n. [Herb. Philip. Bur. Sci. 46383] (Ca--309140); Velasquez 10 (Bi). Samar: R. G. Smith s.n. [Aug. 1945] (Ur). Island undetermined: Née 25 (Q), 28 (Q), 32 (Q). CULTIVATED: Formosa: Keng K.1052 (W--2035769). Martinique: Duss 4442 (B), s.n. (B). Philippine Islands: A. Castillo s.n. [College campus, January 3, 1931] (Hp).

CALLICARPA FORMOSANA f. ALBIFLORA Yamamoto ex Li, Woody Pl. Taiwan 821 & 944, nom. nud. 1963.

Bibliography: Li, Woody Pl. Taiwan 821 & 944. 1963; Moldenke, Résumé Suppl. 8: 3. 1964.

As yet I have not been able to ascertain the original place of publication of this trinomial, if, indeed, it was ever validly published. I assume that the taxon differs from the typical

form of the species in having white corollas. If so, then it is most probable that Lizardo 30 and the specimens cited below belong here, since they are described as having had white flowers.

In all, only 2 herbarium specimens have been examined by me.

Citations: CHINA: Kwangtung: McClure 3038 [Herb. Canton Chr. Coll. 9591] (Ph); W. T. Tsang 21989 (S).

CALLICARPA FORMOSANA f. ANGUSTATA Moldenke, Phytologia 4: 125. 1952.

Synonymy: Callicarpa formosana f. angustata (Rehd.) Moldenke ex Li, Woody Pl. Taiwan 823, sphalm. 1963.

Bibliography: Moldenke, Phytologia 4: 121, 122, & 125. 1952; Moldenke, Biol. Abstr. 27: 984. 1953; Moldenke, Résumé 172, 182, & 444. 1959; Li, Woody Pl. Taiwan 823. 1963; Moldenke, Phytologia 14: 189 & 190. 1966.

This form differs from the typical form of the species in having its leaf-blades uniformly lanceolate.

The type of the form was collected by Harley Harris Bartlett (no. 6082) at Taiheisan, Formosa, at an altitude of 3500--4000 feet, in September, 1936, and is deposited in the Britton Herbarium at the New York Botanical Garden.

It seems very probably to me that Suzuki's C. formosana var. longifolia Suzuki is the same as the form here under discussion, but not having seen any type material of Suzuki's plant, I hesitate to make the reduction. If the taxon is to be regarded as a mere form, rather than a variety, my epithet remains the valid one in any case. The Sasaki s.n. [Herb. Govt. Formosa 21435], Mori s.n. [August 10, 1936], and S. K. Lau 96, cited by me under C. formosana Rolfe, may actually represent f. angustata instead. Li (1963) is in error when he regards my f. angustata as a new combination for Rehder's C. japonica var. angustata (1916). The name proposed by me has nothing whatever to do with the one proposed by Rehder and is based upon an entirely different type, as is plainly stated in the original description! The two taxa are abundantly distinct.

The present plant is described by collectors as a bush or shrub, 3--15 feet tall, the stems 1 inch in diameter, and the fruit purple, growing among bushes and in roadside thickets at 800 meters altitude, flowering in June and November, and fruiting in March and June. Wilson refers to it as "common in open forests" on Formosa. The flowers are described as "pink" on R. S. Williams 1158

Material has been misidentified and distributed in herbaria under the names C. blancoi Rolfe, C. caudata Maxim., C. formosana Rolfe, C. micrantha Vidal, C. pedunculata R. Br., and C. stenophylla Merr.

In all, 11 herbarium specimens, including the type, have been examined by me.

Citations: WESTERN PACIFIC ISLANDS: FORMOSA: H. H. Bartlett 6082 (N--type); Keng & Kao K.1273 (W--2036017); E. H. Wilson 9934 (W--1052891, W--1052892), 11141 (W--1053114, W--1092623). PHIL-

IPPINE ISLANDS: Luzon: E. D. Merrill 1718 (Bz--18147); Ramos & Edaño s.n. [Herb. Philip. Bur. Sci. 46955] (Bz--18138, N); R. S. Williams 1158 (N, W--707432).

CALLICARPA FORMOSANA var. CHINENSIS P'ei, Mem. Sci. Soc. China 1 (3): [Verbenac. China] 30. 1932.

Synonymy: Callicarpa pedunculata var. chinensis (P'ei) Metc., Lingnan Sci. Journ. 11: 405--406. 1932.

Bibliography: P'ei, Mem. Sci. Soc. China 1 (3): [Verbenac. China] 15 & 30. 1932; Metc., Lingnan Sci. Journ. 11: 405--406. 1932; Moldenke, Known Geogr. Distrib. Verbenac., ed. 1, 56 & 86 (1942) and ed. 2, 130 & 177. 1949; Moldenke, Résumé 168 & 444. 1959; Moldenke, Résumé Suppl. 14: 7. 1966.

This variety differs from the typical form of the species in having its leaf-blades oblong to elliptic and entire or subentire and the inflorescences lax and diffuse.

P'ei (1932) describes the plant as a shrub, about 2.5 m. tall; branches and branchlets densely pubescent when young; leaves decussate-opposite; petioles about 2 cm. long; leaf-blades subcoriaceous, oblong or elliptic, 8--15 cm. long, 3--6 cm. wide, shortly acuminate at the apex, entire or subentire, usually acute or subrotund at the base, subglabrous above, densely pubescent and glandular beneath; secondaries about 8 on each side of the midrib; inflorescence axillary or sometimes subterminal, lax and diffuse; peduncles 2--5 cm. long; fruiting-calyx glandular; fruit globose, 2.5 mm. wide, glandular, orange when dry.

The type of this variety was collected by Woon-Young Chun (no. 5828) in open brush between Changkiang and Chengkou, Kwangtung, China, in December, 1927, and is deposited in the Arnold Arboretum herbarium at Cambridge, Massachusetts, where Metcalf states that there are two sheets of this collection. The taxon is known thus far only from the original collection.

In all, 2 herbarium specimens and one photograph of the type collection have been examined by me.

Citations: CHINA: Kwangtung: W. Y. Chun 5828 (Ca--347284--isotype, N--isotype, N--photo of type).

CALLICARPA FORMOSANA var. GLABRESCENS Moldenke, Phytologia 4: 41--42. 1952.

Synonymy: Callicarpa caudatifolia Merr. ex Moldenke, Résumé Suppl. 4: 11, in syn. 1962 [not C. caudatifolia Koidz., 1925, nor Max,, 1962].

Bibliography: Moldenke, Phytologia 4: 41--42 & 77. 1952; Moldenke, Biol. Abstr. 26: 1471. 1952; Moldenke, Résumé 182 & 444. 1959; Moldenke, Résumé Suppl. 4: 11. 1962; Moldenke, Phytologia 14: 142. 1966.

This variety differs from the typical form of the species in having the lower leaf-surfaces entirely glabrous or else sparsely stellate only on the midrib and larger veins.

The type of the variety was collected by Maximo Ramos and Gregorio E. Edaño [Herb. Philippine Bureau of Science 29137] on Mount

Tulaog, in the province of Tayabasi, Luzon, Philippine Islands, in May, 1917, and is deposited in the Britton Herbarium at the New York Botanical Garden. The type of C. caudatifolia Merr. was collected by Richard Crittenden McGregor [Herb. Philippine Bureau of Science 22919] in the province of Laguna, Luzon, between June and August, 1915, and was deposited in the herbarium of the Philippine Bureau of Science at Manila, but is now destroyed. The C. caudatifolia of Koidzumi is a synonym of C. japonica var. angustata Rehd., while that of Maximowicz is C. caudata Maxim.

Collectors describe this variety as a plant 2 m. tall, the stems 3 cm. in diameter, growing in thickets and forests, in open places, and along streams, at "low altitudes" or to 2000 feet altitude, flowering in March, May, and November. The flowers are described as "pink" on Ramos & Edaño s.n. [Herb. Philip. Bur. Sci. 45203 & 47223].

Material has been misidentified and distributed in herbaria as C. formosana Rolfe, C. longifolia Lam., C. micrantha Vidal, and C. pedunculata R. Br.

In all, 15 herbarium specimens, including type material of both names involved, have been examined by me.

Citations: WESTERN PACIFIC ISLANDS: PHILIPPINE ISLANDS: Luzon: Edaño s.n. [Herb. Philip. Bur. Sci. 48817] (N); R. C. McGregor s. n. [Herb. Philip. Bur. Sci. 22919] (W—898252); M. Ramos s.n. [Herb. Philip. Bur. Sci. 27662] (Bz—17660), s.n. [Herb. Philip. Bur. Sci. 47223] (N); Ramos & Edaño s.n. [Herb. Philip. Bur. Sci. 28513] (Bz—18135), s.n. [Herb. Philip. Bur. Sci. 29137] (N—type), s.n. [Herb. Philip. Bur. Sci. 45203] (Ca—308530), s.n. [Herb. Philip. Bur. Sci. 45614] (Bz—18140, N), s.n. [Herb. Philip. Bur. Sci. 47223] (Ca—310116), s.n. [Herb. Philip. Bur. Sci. 49011] (Bz—17656, Bz—17657, N). Mindoro: M. Ramos s.n. [Herb. Philip. Bur. Sci. 46442] (Ca—308873, N).

CALLICARPA FORMOSANA var. LONGIFOLIA Suzuki, Trans. Nat. Hist. Soc. Formos. 25: 130. 1935.

Bibliography: Suzuki, Trans. Nat. Hist. Soc. Formos. 25: 130. 1935; Li, Woody Pl. Taiwan 821 & 944. 1963; Moldenke, Résumé Suppl. 8: 3. 1964; Moldenke, Phytologia 14: 190. 1966.

This variety differs from the typical form of the species in having the leaf-blades thin-membranous, oblong-lanceolate to ovate-oblong-lanceolate, caudate-acuminate at the apex, cuneate at the base, minutely mucronate-dentate along the margins, 13—17 cm. long, 2—3 cm. wide, glabrous beneath except for the puberulous midrib and venation.

The type of the variety was collected by Sigetaka Suzuki (no. 1105) at Doba, Formosa, on July 28, 1929. In his original description the collector notes that "The distinguishing characters between the species and the present variety seem to be found in the shape of the leaves; viz. the latter has longer and more cuneate ones. Moreover, the species and the variety show different

mode of oecological adaptation. The present variety has been rarely found in the shady environment of mountainous regions at medium altitude, while Callicarpa formosana Rolfe is commonly found in low altitudes of Formosa as a chief element of secondary forests."

It seems highly likely that C. formosana f. angustata Moldenke is the same plant as Suzuki's variety, but not having as yet seen any type material of Suzuki's plant, I hesitate to make the reduction. If the taxon is to be regarded as a variety, Suzuki's epithet must be adopted, but if its status is to be that of a mere form, then my epithet remains valid.

CALLICARPA FULVA A. Rich. in Sagra, Hist Cuba 11 (2): 145. 1850 [not C. fulva Griseb., 1911].

Additional & emended synonymy: Callicarpa ferruginea Griseb. apud Urb., Symb. Ant. 7: 356, in syn. 1911 [not C. ferruginea Sw., 1788]. Callicarpa apiculata Urb., Symb. Antil. 7: 356. 1911. Callicarpa suffruticosa C. Wright ex Moldenke in Fedde, Repert. Spec. Nov. 40: 57, in syn. 1936. Callicarpa fulva var. fulva Alain in León & Alain, Fl. Cuba 4: 307. 1957. Callicarpa filigrana Sw., in herb.

Bibliography: Sw., Prodr. 31. 1788; A. Rich. in Sagra, Hist. Cuba 11 (2): 145. 1850; C. Muell. in Walp., Ann. Bot. 5: 709. 1860; Griseb., Pl. Wright. 2: 529. 1862; Griseb., Cat. Pl. Cub. 216. 1866; Sauv., Fl. Cub. 113. 1868; Jacks. in Hook. f. & Jacks., Ind. Kew. 1: 386. 1893; Millsp., Field Columb. Mus. Publ. Bot. 2: 180—181 (1906) and 2: 313. 1909; Urb., Symb. Antil. 7: 356 & 357. 1911; Britton & Millsp., Bahama Fl. 373. 1920; Prain, Ind. Kew. Suppl. 5: 43. 1921; Urb. in Fedde, Repert. Spec. Nov. 20: 346. 1924; Moldenke in Fedde, Repert. Spec. Nov. 33: 141 (1933), 39: 299 (1936), and 40: 53, 56—59, 61, 64, 65, 67, 68, 73, 78, 82, 119, 122, 123, 125, 126, 128, 129, & 131. 1936; Moldenke, Geogr. Distrib. Avicenn. 4. 1939; Moldenke, Prelim. Alph. List Invalid Names 9, 10, & 13. 1940; Moldenke, Known Geogr. Distrib. Verbenac., ed. 1, 24 & 86. 1942; Moldenke, Alph. List Invalid Names 8, 9, & 11. 1942; Moldenke, Alph. List Cit. 1: 75, 76, 184, 185, 187, 273, & 313. 1946; E. J. Salisb., Ind. Kew. Suppl. 10: 38. 1947; Moldenke, Alph. List Cit. 2: 420, 487, 647, & 649—651 (1948), 3: 664, 713, 867, & 929 (1949), and 4: 1085, 1094, 1143, 1144, 1157, 1158, & 1206. 1949; Moldenke, Known Geogr. Distrib. Verbenac., ed. 2, 42 & 177. 1949; H. N. & A. L. Moldenke, Anal. Inst. Biol. Mex. 20: 4. 1950; Moldenke, Inform. Mold. Set 51 Spec. 2. 1956; Alain in León & Alain, Fl. Cuba 4: 305 & 307. 1957; Moldenke, Résumé 50, 241, 243, 247, & 444. 1959; Moldenke, Phytologia 14: 148, 149, 186, & 187. 1966; J. A. Clark, Card Ind. Gen. Sp. Pl. n.d.

Richard's original (1850) description is worth repeating in full here because of the differences in interpretation given his species by various workers in the past: "Callicarpa tota tomentosa-floccosa, fulva; foliis oppositis ovali-lanceolatis aut ob-

ovali-lanceolatis acutis, basi sensim attenuatis margine subcremulatis, superne glabriusculis, subtus ferrugineo-tomentosis, tomento denso stellato, valde reticulato-venosis; cymis axillaribus ferrugineis folio multo brevioribus ramoso-dichotomis; calyce campanulato glabriusculo, ore dilatato et subtruncato; drupa minima glabra, magnitudinem seminis Sinapeos nigrae vix excedente. Crescit in montosis insulae Cubae, in cacumine montium Sierra maestra et Pinal de los Hondones, in provincia de Cuba, ubi detexit clar. J. Linden, no. 1969 et 2006. Observaciones: Este bello arbusto de flores rosadas ó color de lila, está caracterizado por el color del vello que le recubre casi en totalidad. Se aproxima algo, por la figura de sus hojas, á la Callicarpa ferruginea, pero pronto se la distingue por los pelos estrellados que cubren la cara inferior de sus hojas y por la carencia completa de glandulas."

Recent collectors describe the plant as a shrub, 4--6 feet tall, called "filigrana", growing on limestone rocks and cliffs, wet or dry hillsides, in charrascales and wet woods, at altitudes of 400 to 1000 meters, flowering also in April and December, and fruiting in July. The flowers are described as "pink" on R. A. Howard 6053, "white" on León 12015, and "white or slightly purplish" on León, Clément, & Roca 10019.

Morton & Alain 9122 has much the aspect of C. cuneifolia Britton & P. Wils. and may possibly represent a hybrid. The Acuña 13327 specimens cited below are almost as glabrescent as material which is typical of var. glabrescens Moldenke, while his 13326 is very pubescent. Clément 3396 has extremely large and very tomentose leaves.

The C. fulva ascribed to Grisebach, referred to in the synonymy above, is in part C. crassinervis Urb. and in part C. grisebachii Urb., that of "A. Rich. apud Millsp." is C. hitchcockii Millsp., and the C. fulva f. foliis lanceolatis Griseb. is C. lancifolia Millsp.

Millspaugh (1906) makes some extremely interesting comments about what he then called C. fulva but later re-named C. hitchcockii Millsp.: "Mr. Hitchcock's plant [from scrub land and coppice, Cat Island, Bahamas], while having (on account of its greatly reduced leaves) a quite distinct general appearance of difference from C. fulva (as well represented by C. Wright's 1357 Monte Verde, Cuba, May 30, 1859) nevertheless has no other characters of differentiation. It is fairly well connected in leaf size and form with the Wright plant through Mr. Wright's other 1357 collected at the base of Farallones, Sept. 29, 1860, which is in the same fruiting stage as the Hitchcock plant. Of this Farallones plant Mr. Wright says, 'A slender bush 6 to 10 feet high: in thick woods.' Sauvalle .....considers this species synonymous with the Jamaican C. ferruginea Swartz, this however is not the case, the differences are broad and evident. Grisebach in his Catalogus Plantarum Cubensium includes under C. fulva Rich. Mr. Wright's Majanabajo, Cuba 3173 with the remark 'forma foliis lanceolatis'. The sheet of this num-

ber in Herb. Gray, Cambridge (one of Mr. Wright's original series), proves to be an entirely different species" which he then proceeds to name C. lancifolia Millsp.

Material of C. fulva has often been misidentified and distributed in herbaria as C. ferruginea Sw. On the other hand, the Acuña 9868, 10208, & 13327 (in part), Mrs. G. C. Bucher 59, and León & Victorin 20764, distributed as C. fulva, are actually C. ferruginea Sw., while Clément, Alain, & Chrysogone 6698 is C. floccosa Urb. R. A. Howard 6053 is a mixture with C. fulva var. glabrescens Moldenke.

In all, 71 herbarium specimens, including type material of all the names involved, and 22 mounted photographs have been examined by me.

Additional & emended citations: CUBA: Oriente: Acuña 12690 (Es), 13326 (Es, N), 13327, in part (Es, N); Alain & Acuña 7686 (Bm); Alain & López Figueiras 7150 (Bm), 7229 (Bm); Alain & Morton 5078 (Ss), 5114 (Z); G. C. Bucher 113 (Rg--8153); Mrs. G. C. Bucher 128 (N, Rg--8152), 728 (Ha); Clément 3396 (Ha, N); Clément & Alain 3945 (Ha, Ha, N); Clément & Chrysogone 3396 (Mv); Ekman 8773 (N); R. A. Howard 6053, in part (N); León 12015 (Ha), 12328 (Ha), 20186 (N), 20276 (N); León & Clément 20276 (Ha, N), 23029 (N); León, Clément, & Roca 10019 (Ha); León & Victorin 17295 (Ha); Linden 1969 (P--isotype); Matos s.n. [León 18551] (N); Morton & Alain 8993 (W--2285112), 9112 (W--2285210); Van Hermann 11766 (Es); Victorin & Alain 21730 (Ha, N); G. L. Webster 3764 (Mi); C. Wright 430 [Jan.--Jul. 1859] (E--photo, F--244613, S--photo, W--photo), 430 [1860] (Ca--936794), 430 [1860--64; Herb. Sauvalle 1774] (Hv), 3170 [Herb. Sauvalle 1774] (E--119142, F--244615, Hv).

CALLICARPA FULVA var. GLABRESCENS Moldenke in Fedde, Repert. Spec. Nov. 33: 141. 1933.

Bibliography: Moldenke in Fedde, Repert. Spec. Nov. 33: 141 (1933), 39: 299 (1936), and 40: 59, 119, 126, & 131. 1936; Moldenke, Geogr. Distrib. Avicenn. 5. 1939; Moldenke, Known Geogr. Distrib. Verbenac., ed. 1, 24 & 86. 1942; Moldenke, Alph. List Cit. 1: 273 & 310 (1946), 2: 420 & 647 (1948), 3: 664 (1949), and 4: 1143 & 1158. 1949; Moldenke, Known Geogr. Distrib. Verbenac., ed. 2, 42 & 177. 1949; Alain in León & Alain, Fl. Cuba 4: 307. 1957; Moldenke, Résumé 50 & 444. 1959; J. A. Clark, Card Ind. Gen. Sp. Pl. n.d.

This plant has been collected in anthesis in July. R. A. Howard 6053 appears to be a mixture of the typical form of C. fulva and var. glabrescens, at least insofar as the Britton Herbarium material is concerned. Acuña 13327, cited by me under typical C. fulva, is almost as glabrescent and typical material of this variety and may be better placed here.

In all, 18 herbarium specimens, including the type, and 7 moun-

ted photographs have been examined by me.

Additional & emended citations: CUBA: Oriente: Acuña 14117 (Es); Mrs. G. C. Bucher 11456 (Es); R. A. Howard 6053, in part (N, S); León & Clément 23106 (N), 23308 (N); Linden 2087 (Br); C. Wright 430 [1856—7] (Br—isotype, D—612063—isotype, E—119139—type, F—244612—isotype).

CALLICARPA FULVOHIRSUTA Merr., Journ. Straits Br. Roy. Asiat. Soc. 76: 113—114. 1917.

Synonymy: Callicarpa fulvo-hirsuta Merr., in herb.

Bibliography: E. D. Merr., Journ. Straits Br. Roy. Asiat. Soc. 76: 113—114. 1917; A. W. Hill, Ind. Kew. Suppl. 6: 34. 1926; Moldenke, Known Geogr. Distrib. Verbenac., ed. 1, 64 & 86 (1942) and ed. 2, 145 & 177. 1949; Moldenke, Alph. List Cit. 4: 1204. 1949; Moldenke, Résumé 192 & 444. 1959.

Shrub; branches terete, densely fulvous stellate-pubescent with intermixed simple hirsute hairs; branchlets with similar pubescence as the branches; principal internodes 4—7 cm. long; leaves decussate-opposite, dark-brown when dry; petioles 1—1.4 cm. long, densely fulvous stellate-pubescent with intermixed simple hirsute hairs; leaf-blades paler beneath, chartaceous, in general oblong-elliptic, 12—14 cm. long, 5—6.5 cm. wide, subequally narrowed to the sharply acuminate apex, sharply dentate along the margins except for the entire or subentire basal portions, subequally narrowed to the acute base, the upper surface densely hirsute on the midrib and with short scattered hairs on the lamina, the midrib beneath stellate-pubescent and hirsute, the lateral veins and primary reticulation sparingly hirsute with short hairs, the whole surface with pale, shiny, small, waxy glands; secondaries about 12 on each side of the midrib, prominent, curved, anastomosing, and with the reticulation dark-brown in contrast to the paler lamina surface; inflorescence densely fulvous stellate-tomentose or -pubescent with intermixed simple hirsute hairs, the cymes axillary, short-pedunculate, dichotomous, about as long as the petioles, rather lax; bracts linear-lanceolate, 1—3 mm. long; pedicels 1—1.5 mm. long, hirsute; flowers 4-merous; calyx cupuliform, about 1.4 mm. long, the rim subtruncate, obscurely 4-denticulate, sparingly hirsute and with scattered shiny glands on the outer surface; corolla white, 3.5—4 mm. long, externally glandular, subequally 4-lobed, the lobes oblong, about 1.5 mm. long, obtuse at the apex; stamens 4; anthers glandular on the back; fruit depressed-globose, red when mature, about 3 mm. in diameter, sparingly glandular.

The type of this species was collected by Mary Knapp Clemens (no. 9846) between Kibaya and Keung, Mount Kinabalu, British North Borneo, below an altitude of 1000 meters, in flower and fruit on October 29, 1915, and was deposited in the herbarium of the Bureau of Science at Manila, but is now lamentably destroyed. Merrill (1917) comments that this is "A characteristic species readily distinguishable by its brown leaves, its fulvous indumentum composed of stellate hairs with which are mixed simple hirsute ones, and its short, rather lax, inflorescences. It is similar in very many re-

spects to Geunsia havilandii King & Gamble, but the indumentum on its leaves is less dense, while its flowers are smaller and with five, not four stamens, and is hence a true Callicarpa." The taxon is known thus far only from the original collection. It is unfortunate that Merrill obviously accidentally transposed the words "four" and "five" in the comparison quoted above.

In all, 2 herbarium specimens, including the type, and 2 mounted photographs have been examined by me.

Citations: INDONESIA: GREATER SUNDA ISLANDS: British North Borneo: M. K. Clemens 9846 (Ca—214826—isotype, N—photo of type, Ph—type, Z—photo of type).

CALLICARPA FURFURACEA Ridl., Journ. Fed. Malay States Mus. 10: 150. 1920.

Bibliography: H. N. Ridl., Journ. Fed. Malay States Mus. 10: 150. 1920; H. N. Ridl., Fl. Malay Penins. 2: 614—616. 1923; A. W. Hill, Ind. Kew. Suppl. 6: 34 (1926) and 7: 36. 1929; Moldenke, Known Geogr. Distrib. Verbenac., ed. 1, 60 & 86 (1942) and ed. 2, 138 & 177. 1949; Moldenke, Résumé 179 & 444. 1959.

Branches brown-scurfy; leaves decussate-opposite; petioles 12.5 mm. long; leaf-blades membranous, oblong, 12.7 cm. long, 7 cm. wide, acuminate at the apex, dentate along the upper parts of the margins, truncate at the base, smooth above with sunken venation, pale beneath, with whitish veins, the veinlets and reticulation brown-scurfy, the midrib scurfy above; cymes paniculate, terminal, 2.5 cm. long or longer, many-flowered, brown-scurfy; pedicels 1.25 mm. long, white-tomentose; calyx cupuliform, white-tomentose, the rim entire; corolla 2.5 mm. long, regular, white-tomentose, the lobes 4, short, ovate, much shorter than the tube, blunt at the apex; stamens 4; filaments slender, inserted at the base of the corolla-tube and shorter than it; anthers large, oblong, slightly exserted.

The type of this little-known species was collected by Evans at Gunong Senyum, Pahang, Malaya. Ridley (1920) comments that "This is of the section of C. arborea, but distinguished by its brown fur and leaves white beneath with brown, scurfy reticulations." I know nothing of the plant except what is stated in the bibliography listed above.

CALLICARPA GLABRA Koidz., Bot. Mag. Tokyo 32: 56. 1918 [not C. glabra H. J. Lam, 1919].

Synonymy: Callicarpa subpubescens Maxim. ex Koidz., Bot. Mag. Tokyo 32: 56, in syn. 1918 [not C. subpubescens Hook. & Arn., 1838].

Bibliography: J. Matsum., Bot. Mag. Tokyo 3: 318. 1889; Hattori, Journ. Coll. Sci. Univ. Tokyo 23 (10): 34. 1908; J. Matsum., Ind. Pl. Jap. 2 (2): 530. 1912; Koidz., Bot. Mag. Tokyo 32: 56. 1918; A. W. Hill, Ind. Kew. Suppl. 6: 34. 1926; Moldenke in Fedde, Repert. Spec. Nov. 40: 84. 1936; Koidz. in Shirasawa, Icon. Essenc. Forest. Jap. 2: fig. 2487. 1938; Moldenke, Prelim. Alph. List In-

valid Names 13. 1940; Moldenke, Known Geogr. Distrib. Verbenac., ed. 1, 58, 61, & 86. 1942; Moldenke, Alph. List Invalid Names 11. 1942; Hara, Enum. Sperm. Jap. 1: 183. 1948; Moldenke, Known Geogr. Distrib. Verbenac., ed. 2, 133, 140, & 177. 1949; Moldenke, Inform. Mold. Set 48 Spec. [2]. 1954; Moldenke, Phytologia 5: 28. 1954; Moldenke, Résumé 172, 181, 182, 247, & 444. 1959; Hara, Outline Phytogeog. Japan 87. 1959; Moldenke, Résumé Suppl. 4: 8. 1962; Moldenke, Phytologia 14: 163. 1966.

Illustrations: Koidz. in Shirasawa, Icon, Essenc. Forest. Jap. 2: fig. 2487. 1938.

An almost completely glabrous shrub; branchlets terete, at first sparsely stellate-farinose but the pubescence soon evanescent, those of this year dark-purplish or black, those of last year dark-green, the older ones grayish; leaves decussate-opposite, deciduous; petioles 1—2.5 cm. long, at first laxly stellate-pilose, finally completely glabrous; leaf-blades coriaceous or chartaceous, oblong or narrowly oblong, rarely sublinear-oblong, 3--13 cm. long, 1--4.5 cm. wide, obtuse at the apex, remotely denticulate or obscurely repand along the margins, acute or broadly cuneate (rarely obtuse to very obtuse) at the base, sparsely resinous-punctate above and laxly stellate-pilose beneath when young but soon glabrous on both surfaces, drying dark-nigrescent above and brown or rarely yellowish-brown beneath; secondaries 4--7 on each side of the midrib, slightly elevated on both surfaces; cymes many-flowered, pedunculate, 1--3 cm. wide, dense; peduncles subequaling or slightly shorter than the petioles, at first loosely farinose-stellate and resinous-punctate but soon glabrous; pedicels 1--2 mm. long, loosely farinose-stellate-pilose when young and resinous-punctate, soon glabrous; bracts linear-filiform, 3--4 mm. long; bractlets 1 mm. long, persistent; calyx turbinate, about 1.8 mm. long, resinous-punctate on both surfaces, the rim slightly 4-dentate, the teeth very short and obtuse or very obtuse; corolla 4 mm. long, resinous-punctate on the outside, 4-lobed above the middle, the lobes broadly oblong, rounded at the apex; stamens surpassing the corolla; filaments glabrous; anthers oblong, resinous-punctate on both sides; style long-exserted, glabrous; fruit globose, borne in dense cymes, 3—4 mm. wide.

Koidzumi does not actually designate a type for this species, but it appears obvious that he bases the name on a specimen in the herbarium of Tokyo University annotated by Maximowicz as C. subpubescens Hook. & Arn. and which he designates as "Herb. Sci. Coll. Imp. Univ. Tokyo. No. 40" and which was collected in the Bonin Islands. He records the common name "shima-murasaki".

Recent collectors describe the plant as a shrub or bush, 5—12 feet tall, growing on hillsides and in open villages, at 75 meters altitude, flowering in April, August, and September. The flowers are described as "pale-lavender" on Walker, Tawada, & Amano 6507. Wilson reports that the species is "common" on Mukojima. The C. glabra of H. J. Lam, referred to in the synonymy above, is now known as C. lamii Hosokawa.

In all, 6 herbarium specimens have been examined by me.

Citations: WESTERN PACIFIC ISLANDS: RYUKYU ISLAND ARCHIPELAGO: Okinawan Islands: Okinawa: Field & Loew 6m (Mi, W--1942588). Sakishima Islands: Iriomote: Walker, Tawada, & Amano 6507 (Le, W--2093795, Z). BONIN ISLANDS: Mukojima: E. H. Wilson 8332 (W--1051813).

CALLICARPA GLANDULOSA Fletcher, Kew Bull. Misc. Inf. 1938: 199. 1938.

Bibliography: Fletcher, Kew Bull. Misc. Inf. 1938: 199, 412, & 414. 1938; Moldenke, Known Geogr. Distrib. Verbenac., ed. 1, 59 & 87. 1942; E. J. Salisb., Ind. Kew. Suppl. 10: 38. 1947; Moldenke, Known Geogr. Distrib. Verbenac., ed. 2, 137 & 177. 1949; Anon., Kew Bull. Gen. Index 1929-1956, 59. 1959; Moldenke, Résumé 177 & 444. 1959.

A shrub, of diffuse habit, about 2 m. tall; branchlets obtusely tetragonal, often terete, brownish-gray, glabrous; leaves decussate-opposite; petioles 5--15 mm. long, canaliculate above, sparsely stellate-pubescent; leaf-blades chartaceous, elliptic or oblong-elliptic, 9--17 cm. long, 4.5--5 cm. wide, acuminate at the apex, dentate along the margins, cuneate at the base, brownish-green above and sparsely stellate-pubescent, with numerous round red sessile glands, gray-green beneath; midrib conspicuous above, prominent beneath; secondaries 4--6 pairs, conspicuous above, prominulous beneath, parallel, arcuately joined at the margins; tertiaries transverse, slender, more or less parallel; inflorescence composed of axillary cymes; primary peduncles 3--5 cm. long, somewhat pubescent; pedicels 2 mm. long, glabrous; bractlets small, linear, to 2 mm. long; flowers not seen; fruit purple, globose, 3--4 mm. wide, glabrous, with sessile yellow glands at the apex.

The type of this little-known species was collected by Arthur Francis George Kerr (no. 11469) at Chumpawn, Ta Ngaw, Surat, Thailand, by streams in an evergreen forest at an altitude of about 50 meters. I know nothing of it except what is stated in the literature listed above. Fletcher (1938) notes "C. longifoliae Lamk. affinis sed foliis glandulis rubris nec flavis praeditis, nervis lateralibus paucioribus differt."

CALLICARPA GRACILIPES Rehd. in C. S. Sarg., Pl. Wils. 3: 371. 1916.

Bibliography: Rehd. in C. S. Sarg., Pl. Wils. 3: 371. 1916; H. H. Chung, Mem. Sci. Soc. China 1 (1): 226. 1924; A. W. Hill, Ind. Kew. Suppl. 6: 34. 1926; P'ei, Mem. Soi. Soc. China 1 (3): [Verbenac. China] 15 & 26. 1932; Moldenke, Known Geogr. Distrib. Verbenac., ed. 1, 56 & 87 (1942) and ed. 2, 130 & 177. 1949; Moldenke, Résumé 168 & 444. 1959.

Apparently a shrub; branchlets terete, the younger parts covered with a yellowish farinose-stellate tomentum; principal internodes abbreviated; leaves decussate-opposite, apparently persistent; petioles 6--8 mm. long, flavescent-tomentose; leaf-blades chartaceous, rather shiny and dark-green above, elliptic-ovate or ovate-oblong, 4--7.5 cm. wide, plainly acuminate at the apex, sinuate-dentate or

remotely denticulate along the margins except on the lower one-third, sometimes almost entire, at first sparsely farinose-stellate-pilose above, later glabrous or almost glabrous, canescent beneath, with the veins flavescent, densely covered with stellate many-branched hairs and scattered glands under the tomentum; secondaries 6 or 7 on each side of the midrib, slightly impressed above, elevated and distinct beneath with a flavescent color; cymes few-flowered, small, 1—1.5 cm. in diameter, yellowish farinose-tomentose; pedicels slender, surpassing the petiole by 1 cm.; flowers not seen; fruiting-calyx sparsely stellate-pilose, glabrescent, the rim obsoletely 4-denticulate; fruit apparently purple, subglobose, scarcely 3 mm. in diameter.

The type of this distinctive species was collected by Augustine Henry (no. 7690) somewhere in western Hupeh, China, and is deposited in the Gray Herbarium of Harvard University. Rehder (1916) comments that "This species does not seem to be closely related to any other Chinese species; it is characterized by its comparatively small, generally elliptic-ovate leaves, dark green above, whitish tomentose beneath, and by its small inflorescence and slender petioles and peduncles, the latter slightly exceeding the former." P'ei (1932) adds that "The plant as a whole is more leafy than its allies, because of its short internodes. It is allied to Callicarpa cana L. from which it differs by its smaller leaves which are shining above."

Only one herbarium specimen of this species has been examined by me.

Citations: CHINA: Hupeh: H. C. Chow 769 (N).

CALLICARPA GRISEBACHII Urb., Symb. Antil. 7: 356—357. 1911.

Emended synonymy: Callicarpa fulva Griseb. (in part) apud Urb., Symb. Antil. 7: 357, in syn. 1911 [not C. fulva A. Rich., 1850].

Bibliography: A. Rich. in Sagra, Hist Cuba 11 (2): 145. 1850; Griseb., Pl. Wright. 2: 529. 1862; Griseb., Cat. Cub. 216. 1866; Urb., Symb. Antil. 7: 356—357. 1911; Prain, Ind. Kew. Suppl. 5: 43. 1921; Urb. in Fedde, Repert. Soec. Nov. 20: 346. 1924; Moldenke in Fedde, Repert. Spec. Nov. 39: 300 (1936) and 40: 57, 59, 63—65, 67, 119, 122, 123, 125, & 131. 1936; Moldenke, Geogr. Distrib. Avicenn. 6. 1939; Moldenke, Prelim. Alph. List Invalid Names 10. 1940; Moldenke, Known Geogr. Distrib. Verbenac., ed. 1, 24 & 87. 1942; Moldenke, Alph. List Invalid Names 9. 1942; Moldenke, Alph. List Cit. 1: 75, 185—187, & 306. 1946; H. N. & A. L. Moldenke, Pl. Life 2: 62. 1948; Moldenke, Alph. List Cit. 2: 420 & 487 (1948), 3: 867 (1949), and 4: 1143. 1949; Moldenke, Known Geogr. Distrib. Verbenac., ed. 2, 42 & 177. 1949; Alain in León & Alain, Fl. Cuba 4: 305 & 309. 1957; Moldenke, Résumé 50, 243, & 444. 1959; Moldenke, Phytologia 14: 42 & 149. 1966.

The flowers are described as "pale rose-violet" on Ekman 8672. The Alain & Morton 5222, distributed as this species, is actually C. areolata Urb.

In all, 29 herbarium specimens, including type material of all

the names involved, and 20 mounted photographs have been examined by [illegible].

Additional & emended citations: CUBA: Oriente: Clément 5930 (N); Ekman 8672 (Go--photo, N), 8926 (Br--photo), 9217 (I--photo, N), 15633 (Mi, Mi--photo, N); C. Wright 1357, in part [Sept. 1859 --Jan. 1860] (Br--isotype, E--119141--isotype, E--photo of type, F--183673--isotype, Mi--photo of isotype, S--photo of type, W--photo of type).

CALLICARPA HAVILANDII (King & Gamble) H. J. Lam, Verbenac. Malay. Arch. 52. 1919.

Synonymy: Geunsia beccariana Briq. in Engl. & Prantl, Nat. Pflanzenfam. 4 (3a): 165, nom. nud. 1895. Geunsia havilandii King & Gamble, Kew Bull. Misc. Inf. 1908: 105. 1908. Callicarpa havilandii var. pentamera H. J. Lam, Verbenac. Malay. Arch. 52. 1919. Callicarpa havilandii var. tetramera H. J. Lam, Verbenac. Malay. Arch. 52. 1919. Callicarpa havilandii H. J. Lam apud A. W. Hill, Ind. Kew. Suppl. 6: 34. 1926. Callicarpa ferox Bakh. ex Moldenke, Résumé 243, in syn. 1959.

Bibliography: King & Gamble, Kew Bull. Misc. Inf. 1908: 105. 1908; King & Gamble, Journ. Roy. Asiat. Soc. Bengal 74 (2), extra no., 801--802. 1908; King & Gamble, Mat. Fl. Malay. Penins. 21: 1011. 1909; H. J. Lam, Verbenac. Malay. Arch. 46, 52, & 362. 1919; Bakh., Bull. Jard. Bot. Buitenz., ser. 3, 3: 10 & 17--18. 1921; A. W. Hill, Ind. Kew. Suppl. 6: 34. 1926; Moldenke, Prelim. Alph. List Invalid Names 10 & 26. 1940; Moldenke, Known Geogr. Distrib. Verbenac., ed. 1, 65 & 87. 1942; Moldenke, Alph. List Invalid Names 9, 24, & 25. 1942; Moldenke, Alph. List Cit. 1: 266 & 267. 1946; H. N. & A. L. Moldenke, Pl. Life 2: 63. 1948; Moldenke, Alph. List Cit. 3: 751 & 763 (1949) and 4: 1173. 1949; Moldenke, Known Geogr. Distrib. Verbenac., ed. 2, 145 & 177. 1949; Moldenke, Phytologia 4: 81 & 82. 1952; Moldenke, Résumé 192, 193, 243, & 444. 1959.

Shrub or tree, about 3.3 m. tall; branchlets densely and rugosely stellate-pubescent with tawny or ferruginous hairs; leaves decussate-opposite, short-petiolate, not anisophyllous; petioles thick, 1--2.5 cm. long, densely and rugosely stellate-pubescent, fulvous-hispid, or rugose-hairy, with long tawny or ferruginous hairs; leaf-blades chartaceous or subchartaceous, ovate or ovate-oblong to elliptic or oblong, often subobovate, 6--20 cm. long, 3--7 cm. wide, acuminate or subabruptly short-acuminate and mucronate at the apex, denticulate along the margins except at the base, acute or acuminate to cuneate and entire at the base, densely and permanently rugose-pubescent with long ferruginous simple hairs (especially on the midrib) above, rather softly and densely or rugosely stellate-hairy and glandular beneath with simple and ferruginous permanent hairs on the venation only, the resin-glands large and peltate; midrib coarsely prominent; secondaries 7--15 pairs; veinlet reticulation conspicuous; cymes small, axillary, subsessile, few-flowered, 1.5--3 cm. long, 3--4 cm. wide, scarcely equal-

ing the subtending petioles, densely and rugosely stellate-hairy with tawny or ferruginous hairs; peduncles 3--10 mm. long, rugosely stellate-pubescent; bractlets minute, subulate; pedicels short, slender; calyx campanulate, 1--2 mm. long, 1--1.5 mm. wide, glabrous on the inner surface, strigose-hispid or densely and rugosely stellate-hairy with ferruginous hair and glandular with large resin-glands on the outer surface, its rim shortly 4- or 5-toothed or subentire, the teeth sometimes large and deltoid, 1--1.5 mm. long; corolla white, campanulate, 3.5--5 mm. long, glabrous, glandulose with large peltate and shiny resin-glands on the outer surface, the tube 2--2.5 mm. long, 1 1/2 -- 2 times as long as the calyx, the lobes 4 or 5, half as long as the tube, ovate or oblong, rounded at the apex, finally recurved; stamens 4 or 5, 6 mm. long, exserted; filaments slender, glabrous; anthers broad, oblong, 1.5--2 mm. long, fulvous-glandular on both sides (especially on the back) with small dense resin-glands; style filiform, 5--8 mm. long; stigma capitate or subpeltate, more or less obscurely 5-lobed; ovary glabrous, densely glandulose with large bright-yellowish resin-glands, 4- or 5-lobed, the cells 1- or 2-ovulate; fruiting-calyx somewhat enlarged, persistent, flattened; fruit drupaceous, red when fresh, globose, rather large, 3--5 mm. wide, somewhat depressed at the apex, glabrous when mature, with sparse resin-glands, purple-black when dry, with 4--8 [--12] 1-seeded pyrenes.

King & Gamble (1908) based this species on four collections from Sarawak: Beccari 3240 and Haviland 889, 3549K, & 3549L, the second of these having been collected near Kuching and the others with no specific locality mentioned. The type of C. ferox is Teijsmann 8500 from Borneo, deposited in the Herbarium Bogoriense at Buitenzorg.

Lam (1919) says "Without any doubt King & Gamble's species is a Callicarpa (only opposite leaves, leaves denticulate, cymes sessile, fruit with 4--5 (not 7--12) pyrenes). As in some other species of this genus there is a pentamerous form." His var. pentamera is merely a new name and status for the original King & Gamble taxon and is therefore based on the same cotypes. His var. tetramera is based on Haviland & Hose 3549E from near Kuching, Sarawak, collected in flower and young fruit in November, 1894. It is worth noting that Lam is emphatic in stating that this plant has only 4 or 5 pyrenes in its fruit, but Bakhuizen van den Brink (1921) says that the pyrenes are "4--8 [--12]", the larger number, according to Lam, being characteristic of Geunsia. It seems obvious that this species forms a connecting link between the two genera.

The original publication of Geunsia beccariana is dated "1897" by Lam (1919) and by Bakhuizen van den Brink (1921), but actually appeared in 1895. The latter author comments that it "is a doubtful species.....Its relation with the C. Havilandii (King/Gamble) H. J. L. is not yet certain."

Callicarpa havilandii has been found growing in forests. The flowers are reported as "white" on Clemens & Clemens 21784, Moul-

ten 79, and Native collector 2827. Haviland & Hose mistakenly refer to the fruits as "berries".

In all, 11 herbarium specimens and 4 mounted photographs have been examined by me.

Citations: INDONESIA: GREATER SUNDA ISLANDS: Borneo: Jaheri 1734 (Bz--17607, Bz--17608); Teijsmann 8500 (Bz--17604, Bz--17605, Bz--17606, N). Sarawak: Clemens & Clemens 21784 [field no. 6161] (Bz--17609, N); Haviland & Hose 3549 (V); Moulton 79 [Native collector 2827] (N--photo, N--photo, Ph, Ph, Z--photo, Z--photo).

CALLICARPA HITCHCOCKII Millsp., Field Columb. Mus. Publ. Bot. 2: 312--313. 1909.

Emended synonymy: Callicarpa fulva "A. Rich." apud Millsp., Field Columb. Mus. Publ. Bot. 2: 180--181. 1906 [not C. fulva Griseb., 1911, nor A. Rich., 1850]. Callicarpa hitchcockiana Millsp. ex Moldenke in Fedde, Repert. Spec. Nov. 40: 59, in syn. 1936.

Bibliography: A. Rich. in Sagra, Hist Cuba 11 (2): 145. 1850; Millsp., Field Columb. Mus. Publ. Bot. 2: 180--181 (1906) and 2: 312--313. 1909; Prain, Ind. Kew. Suppl. 4: 34. 1913; Britton & Millsp., Bahama Fl. 373. 1920; Moldenke in Fedde, Repert. Spec. Nov. 39: 301 (1936) and 40: 59--62, 119, 121, 123, 125, & 129. 1936; Moldenke, Alph. List Common Vern. Names 5. 1939; Moldenke, Geogr. Distrib. Avicenn. 4 & 5. 1939; Moldenke, Prelim. Alph. List Invalid Names 10 & 11. 1940; Moldenke, Known Geogr. Distrib. Verbenac., ed. 1, 24 & 87. 1942; Moldenke, Alph. List Invalid Names 9. 1942; Moldenke, Phytologia 2: 94. 1945; Moldenke, Alph. List Cit. 1: 56, 65, 179, 272, 305, 307, 308, & 311. 1946; H. N. & A. L. Moldenke, Pl. Life 2: 64. 1948; Moldenke, Alph. List Cit. 2: 415 & 549 (1948), 3: 928 & 929 (1949), and 4: 1038 & 1039. 1949; Moldenke, Known Geogr. Distrib. Verbenac., ed. 2, 42 & 177. 1949; Alain in León & Alain, Fl. Cuba 4: 305 & 308. 1957; Moldenke, Résumé 49, 50, 243, & 444. 1959; Moldenke, Phytologia 14: 149. 1966; J. A. Clark, Card Ind. Gen. Sp. Pl. n.d.

In all, 38 herbarium specimens, including type material of all the names involved, and 15 mounted photographs have been examined by me.

Additional & emended citations: BAHAMA ISLANDS: Andros: L. J. K. Brace 6965 (F--214369), 7100 (F--214495). Cat: Britton & Millspaugh 5819 (D--532333, F--198620, F--198621, Ol, W--845021), 5913 (F--198707--type), 5946 (F--198726); A. S. Hitchcock s.n. [Port Howe] (E--47342, F--175149). New Providence: Eggers 4469 (B, K, N, S). CUBA: Camagüey: Shafer 2456 (F--250995, W--848702), 2791 (F--251258, W--848931).

CALLICARPA INAEQUALIS Teijsm. & Binn. ex H. J. Lam, Verbenac. Malay. Arch. 77--78, in syn. 1919; Bakh., Bull. Jard. Bot. Buitenz., ser. 3, 3: 18--19. 1921.

Synonymy: Callicarpa erioclona var. latifolia H. J. Lam, Ver-

benac. Malay. Arch. 77—78. 1919. Callicarpa backeriana Bakh. ex Moldenke, Résumé 241, in syn. 1959. Callicarpa inaequalis "T. & B. ex Bakh." apud Backer & Bakh., Fl. Java 2: 600. 1965.

Bibliography: H. J. Lam, Verbenac. Malay. Arch. 77—78 & 362. 1919; Bakh., Bull. Jard. Bot. Buitenz., ser. 3, 3: 10 & 18—19. 1921; A. W. Hill, Ind. Kew. Suppl. 7: 36. 1929; Moldenke, Prelim. Alph. List Invalid Names 10. 1940; Moldenke, Alph. List Invalid Names 9. 1942; Moldenke, Known Geogr. Distrib. Verbenac., ed. 1, 64 & 87 (1942) and ed. 2, 144 & 177. 1949; Moldenke, Phytologia 4: 79, 80, & 83. 1952; Moldenke, Résumé 187, 189, 194, 241, 242, & 444. 1959; Backer & Bakh., Fl. Java 2: 600. 1965; Moldenke, Phytologia 14: 178. 1966.

An erect shrub, 2—3 m. tall; branchlets obtusely tetragonal, rugose, very densely stellate-farinose with subferruginous, brown or white hairs, resinous-punctate beneath the tomentum, sparsely lenticellate; leaves decussate-opposite, long-petiolate; petioles 3—5 cm. long, distinctly callose-connate at the base, sulcate above, densely appressed-farinose; leaf-blades coriaceous or chartaceous, rather large, broadly ovate-oblong or subobovate to subovate, ovate, or oblong-ovate, 10—29 cm. long, 5—12 cm. wide, acuminate to subabruptly and obtusely short-acuminate or obtuse at the apex, unequally repand- or coarsely serrate-dentate or coarsely dentate along the margins except at the base, rarely only denticulate, the teeth usually with deep simuses, obtuse or rounded to truncate (rarely cordate, subcordate, or even acute) at the base, glabrous above when mature, densely and permanently incanous-subfarinose-tomentose beneath, resinous-punctate and with scattered peltate glands on both surfaces, reticulate-veined; secondaries 7—10 on each side of the midrib; cymes small, solitary, 2—3 cm. long, 3—5 cm. wide, loosely few-flowered, short-pedunculate, very densely appressed-farinose; pedicels 1—1.5 cm. long, 1—1.5 mm. wide, very densely incanous- or ferruginous-farinose or appressed-pubescent, the margin glabrescent, resinous-punctate on both surfaces, the rim very shortly 4-dentate or -denticulate to subtruncate; corolla pink, 4—5 mm. long, glabrous inside, very densely appressed-tomentose or appressed-pubescent outside, resinous-punctate on both surfaces, its tube cupuliform, 2.5—3 mm. long, 1 1/2 -- 2 times as long as the calyx, the lobes 4, 1.5—2 mm. long, 1—1.2 mm. wide, subuniform, oblong, obtuse or rounded at the apex; stamens 4, 4—5 mm. long, shortly or hardly at all exserted; filaments filiform, terete, glabrous; anthers oblong, 2—2.5 mm. long, dorsifixed below the middle, opening by longitudinal slits, resinous-punctate; style terete, filiform, 6—8 mm. long, short-exserted; stigma peltate, obscurely lobed; ovary globose, densely stellate-pilose with white hairs and resinous-punctate, 4-celled, the cells 2-ovulate; fruiting-calyx scarcely enlarged; fruit drupaceous, rather large, depressed-globose, 2.5—3.5 mm. wide, dark-purple or black when mature, sparsely stellate-pilose and resinous-punctate; seed 4—8, laterally compressed.

The type of this species was not clearly designated by Bakhuizen van den Brink (1921) when he formally and validly published

the name which Lam (1919) had merely taken up in synonymy. However, it seems clear that sheet no. 17613 in the Herbarium Bogoriense, collected at Tjiampea, Bogor [Buitenzorg], by an undesignated collector, is intended to be the type, and I have so designated it [=lectotype]. Callicarpa backeriana is based on an unnumbered collection made by Cornelis Andries Backer -- in whose honor it was named -- at Bandjar, Java, on December 27, 1910, and is also deposited in the Herbarium Bogoriense at Buitenzorg.

Lam (1919) regarded this taxon as a mere variety of C. erioclona Schau., from which he distinguished it by the following characters: "folia chartacea, ovata vel oblongo-ovata, basi cuneata, plerumque subrotundata, abrupte attenuata, apice acuminata, margine, praeter basin, grosse dentata, dentibus simubus profundis, nervis utrinque 8, 7--17 cM. longa, 4 1/2 -- 11 1/2 cM. lata, petiolo 0.7--3.2 cM. longo." He based his var. latifolia on Forbes 1355 and De Vriese s.n. (Le--908.267-1091, Le--908.267-1092) from Java. He gives as the basis for C. inaequalis "3 specimina in Herb. var. botan. in Acad. Lugd.-Bat., in H. L.-B. sub nos. 908.265-1104, 1110 and 1146."

The species has been found growing in light forests and is said to bloom all through the year at altitudes of 50 to 500 meters. The flowers are described as "pink" on Iboet 221. The leaf-blades are merely denticulate on Lörzing & Jochems 7427, and this specimen may not be correctly placed here.

In all, 37 herbarium specimens, including type material of all the names involved, and 2 mounted photographs have been examined by me.

Citations: INDONESIA: GREATER SUNDA ISLANDS: Celebes: Zijll de Jong 7/V.2 [Boschbouwproefst. bb.20215] (Bz--18703). Java: Backer 5936 (Bz--17625, Bz--17626), 33426 (Bz--17627, Bz--17628), s.n. [Bandjar, 27.12.1910] (Bz--25467); Bakhuizen van den Brink 1798 (Bz--17617), 1833 (Bz--17619, Bz--17620, Bz--17621, Bz--17622, Ca--235073, Ca--265995, Ut--24876a, Ut--25468, Ut--67004), 5933 (Bz--17623, Bz--17624, Ca--236614, N, Ut--80253), 7209 (B, Bz--17614, Bz--17615); Collector undetermined s.n. [Tjiampea, Bogor] (Bz--17612--isotype, Bz--17613--type, N--photo of type, Z--photo of type); d'Arnaud Gerkens 361 (Bz--17618, Ca--234994); Docters van Leeuwen-Reijnvaan 7691 (Bz--17616, Ca--301563); Van Steenis 2697 (Bz--17610, Bz--17611, N). Sumatra: Iboet 221 (Bz--17629, Bz--17630); Lörzing & Jochems 7427 (Bz--17631, Bz--17632).

CALLICARPA INTEGERRIMA Champ. ex Benth. in Hook., Journ. Bot. & Kew Gard. Misc. 5: 135. 1853.

Additional & emended synonymy: Callicarpa integrifolia Champ. ex Forbes & Hemsl., Journ. Linn. Soc. Lond. Bot. 26: 353. 1890 [not C. integrifolia Jacq., 1780]. Callicarpa integrifolia Forbes & Hemsl. apud P'ei, Mem. Sci. Soc. China 1 (3): [Verbenac. China] 22, in syn. 1932. Callicarpa tomentosa Bakh. (in part) apud P'ei, Mem. Sci.

Soc. China 1 (3): [Verbenac. China] 22, in syn. 1932 [not C. tomentosa Auct., 1962, nor Hook. & Arn., 1918, nor König, 1893, nor L., 1959, nor "L. [ex Spreng.]", 1825, nor "L. [ex Willd.]", 1966, nor (L.) Murr., 1774, nor Lam., 1783, nor Murr., 1774, nor Thunb., 1959, nor Vahl, 1794, nor Willd., 1808, nor "sensu Matsum.", 1906]. Callicarpa integerrima Lindl. ex Moldenke in Fedde, Repert. Spec. Nov. 40: 107, in syn. 1936; Prelim. Alph. List Invalid Names 11, in syn. 1940. Callicarpa integerrima var. diffusa P'ei ex Moldenke, Résumé Suppl. 3: 30, in syn. 1962.

Bibliography: J. A. Murr. in L., Syst. Veg., ed. 13, 130. 1774; Jacq., Select. Stirp. Amer. Hist. Picta, ed. 2, 13, pl. 259, fig. 6. 1780; Champ. ex Benth. in Hook., Journ. Bot. & Kew Gard. Misc. 5: 135. 1853; C. Muell. in Walp., Ann. 5: 709. 1860; Benth., Fl. Hongk. 270. 1861; Maxim., Bull. Acad. Imp. Sci. St.-Pétersb. 31: 75. 1886; Maxim., Mél. Biol. 12: 505. 1886; Forbes & Hemsl., Journ. Linn. Soc. Lond. Bot. 26: 353. 1890; Jacks. in Hook. f. & Jacks., Ind. Kew. 1: 386. 1893; Dunn & Tutcher, Kew Bull. Misc. Inf. Addit. Ser. 10: 202. 1912; Bakh., Bull. Jard. Bot. Buitenz., ser. 3, 3: 21. 1921; H. H. Chung, Mem. Sci. Soc. China 1 (1): 226. 1924; P'ei, Mem. Sci. Soc. China 1 (3): [Verbenac. China] 22--23. 1932; Moldenke in Fedde, Repert. Spec. Nov. 39: 300 (1936) and 40: 107—109, 120, & 123. 1936; A. W. Hill, Ind. Kew. Suppl. 9: 45. 1938; Moldenke, Geogr. Distrib. Avicenn. 36. 1939; Moldenke, Prelim. Alph. List Invalid Names 11 & 13. 1940; Moldenke, Known Geogr. Distrib. Verbenac., ed. 1, 56, 58, 71, & 87. 1942; Moldenke, Alph. List Invalid Names 9 & 11. 1942; Moldenke, Alph. List Cit. 1: 207. 1946; Moldenke, Phytologia 2: 343 (1947) and 3: 139. 1949; Moldenke, Alph. List Cit. 3: 771 (1949) and 4: 1011. 1949; Moldenke, Known Geogr. Distrib. Verbenac., ed. 2, 130, 134, 157, & 177. 1949; H. N. & A. L. Moldenke, Anal. Inst. Biol. Mex. 20: 4. 1950; Moldenke, Résumé 168, 173, 213, 243, 247, & 444. 1959; Moldenke, Résumé Suppl. 3: 30 (1962) and 14: 3. 1966; Moldenke, Phytologia 13: 502 (1966) and 14: 37, 107, & 111. 1966.

Recent collectors describe this plant as "semi-woody", a "climber", a "tall strong climber", or an "entangled coarse woody vine", 5—30 feet long, the bark gray or grayish-green, the shoots grayish-tawny or tawny-green, the leaves light-green or deep lustrous-green above, greenish-tawny or grayish beneath, the flowers fragrant, the young fruit round and green or greenish, and the mature fruit "gray" or purple. It has been found growing in thickets and open thickets, at altitudes of 300—800 meters, flowering from July to October, fruiting in August and October. Tsang calls it fairly common as scattered shrubs in clay of roadsides or "fairly common in dry clay" in Kwangtung, while Ching refers to it both as "common" and as "rare" in Kwangsi.

The type of C. integerrima var. diffusa was collected by Ren-Chang Ching (no. 2425) in the region of Kingyuan, at an altitude of 300 to 800 meters, Chekiang, China, in August or September, 1924, and is deposited in the United States National Herbarium at Washington.

It should be noted here that the species is reduced to synonymy

under C. tomentosa (L.) Murr. by Bakhuizen van den Brink (1921). The C. tomentosa of Bakhuizen van den Brink is in part C. integerrima and in part C. arborea Roxb.; that ascribed to "Auct.", to Hooker & Arnott, to Willdenow, and "sensu Matsum." is C. loureiri Hook. & Arn.; that ascribed to König is C. macrophylla Vahl; that ascribed to Linnaeus is C. erioclona Schau., but the C. tomentosa L. [ex Spreng.] is C. candicans (Burm. f.) Hochr. as is also C. tomentosa Lam,; C. tomentosa (L.) Murr. is a valid species, with the homonym ascribed to Murray along and to "L. [ex Willd.]" as synonyms; that ascribed to Thunberg is C. longifolia Lam., while the C. tomentosa Vahl has not yet been satisfactorily placed. The C. integrifolia of Jacquin is Aegiphila integrifolia (Jacq.) Jacks.

The flowers of C. integerrima have been described as "white" on T. W. Tsang 21107, "pink" on W. T. Tsang 23914, and "purplish-red" on W. T. Tsang 21650. The vernacular names "lo hai ngan" and "lo hai ngan muk" have been recorded for it.

Champion's original (1853) description of the species is worth repeating here in view of differences of opinion on the validity of the taxon: "ramulis cum cymis foliorumque pagina inferiore tomento stellato flavicante dense lanatis, foliis petiolatis late ovatis acuminatis integerrimis supra pube stellata conspersis, cymis folia subaequantibus, floribus parvis numerosissimis, calyce lanato minute 4-dentato. -- Folia 3--4 poll. longa, 2 — 2 1/2 poll. lata (inferiora mihi desunt), supra viridia v. subflavescentia, mollia, punctis glandulosis inconspicuis sub lana reconditis, petiolo semipollicari. Cymae amplae, laxae, pedunculo 1 — 1 1/2-pollicari, ramis primariis elongatis. Flores magnitudine C. macrophyllae. Hongkong. The broad entire leaves and the dense golden-coloured tomentum readily distinguish this species from the C. macrophylla, C. lanata, and others to which it is allied."

P'ei (1932) amplifies the description as follows: "A shrub of about 10 feet tall; with branches, branchlets, petioles and inflorescences clothed with a dense floccose golden-colored tomentum or wool. Leaves broadly ovate-oblong, to nearly oblong or ovate, shortly acuminate to obtuse, base rounded, 8 to 14 cm. long, 4.2 to 10 cm. wide, thickly chartaceous, entire or slightly undulate, glabrous or nearly so above, densely tomentose or woolly and golden colored beneath, lateral nerves 7 or 8 on each side of the midrib. Petioles densely tomentose, about 1 cm. long, channelled. Cymes axillary, loose, with very numerous small flowers. Calyx tomentose, truncate or with rudimentary teeth, about 0.8 mm. long. Corolla glabrous, 4-lobed; corolla-tube slightly longer than the calyx-tube; corolla-lobes as long as the tube. Stamens 4, exserted, filaments 4 times as long as the corolla, glabrous. Style glabrous, exceeding the stamens. Ovary densely pubescent. Fruit pubescent, becoming subglabrous at maturity, 2 to 3 mm. in diameter, subglobose."

Material has been misidentified and distributed in herbaria as C. arborea Roxb. and as C. siongsaiensis Metc.

Forbes & Hemsley (1890) cite Millett s.n. from somewhere in China and Champion s.n., C. Ford s.n., and C. Wright s.n. from Hongkong. Maximowicz (1886) cites the same Ford and Wright collections and adds Bentham s.n. from southern China and Forbes s.n. from Hongkong. P'ei (1932) cites the same Ford and Wright collections and adds Ching 2425 from Chekiang and Sargent s.n. [Nov. 5, 1903] from Hongkong. The Ford and Wright collections are often referred to as topotypes of the species.

In all, 28 herbarium specimens and 2 mounted photographs have been examined by me.

Additional & emended citations: CHINA: Chekiang: R. C. Ching 2425 (Ca—281468, N, W—1247246). Kiangsi: S. K. Lau 4054 (S, W—1752793). Kwangsi: R. C. Ching 6993 (N), 8034 (N); W. T. Tsang 23914 (N). Kwangtung: W. T. Tsang 21107 (Bz—17633, Ca—111418, I, N, N, S), 21650 (Ca—111676, I, N, N, S). Province undetermined: A. Henry s.n. [Wongneuchung] (N). HONGKONG: C. Ford s.n. [Hongkong] (N); C. Wright s.n. [Hong Kong] (T, W—44907). CULTIVATED: New York: N. Taylor s.n. [New York Bot. Gard. Cult. Pl. 14244] (Mi—photo).

CALLICARPA INTEGERRIMA var. SERRULATA Li, Journ. Arnold Arb. 25: 425. 1944.

Bibliography: Li, Journ. Arnold Arb. 25: 425. 1944; Moldenke, Phytologia 2: 343. 1947; Moldenke, Known Geogr. Distrib. Verbenac., ed. 2, 130 & 177. 1949; Moldenke, Résumé 168 & 444. 1959; Moldenke, Résumé Suppl. 14: 3. 1966.

This variety differs from the typical form of the species in having the leaf-blades serrulate along the margins.

The type of the variety was collected by Wai-Tak Tsang (no. 25228) at Ch'an Woh Tung village, T'sung-hwa district, Sam Kok Shan, Kwangtung, China, between May 1 and 25, 1935, and is deposited in the Arnold Arboretum herbarium at Cambridge, Massachusetts.

Material has been misidentified and distributed in herbaria as C. macrophylla Vahl. Only one herbarium specimen has been examined by me.

Citations: HONGKONG: C. Wright s.n. [Hong Kong] (W—44914).

CALLICARPA INVOLUCRATA Merr., Journ. Malay. Br. Roy. Asiat. Soc. 1: 31—32. 1923.

Synonymy: Callicarpa involucrata f. clemensae Bakh. ex Moldenke, Résumé 243, in syn. 1959.

Bibliography: E. D. Merr., Journ. Malay. Br. Roy. Asiat. Soc. 1: 31—32. 1923; A. W. Hill, Ind. Kew. Suppl. 7: 36. 1929; Moldenke, Known Geogr. Distrib. Verbenac., ed. 1, 64 & 87 (1942) and ed. 2, 145 & 177. 1949; Moldenke, Alph. List Cit. 3: 840. 1949; Moldenke, Phytologia 4: 81 & 82. 1952; Moldenke, Résumé 192, 193, 243, & 444. 1959; Moldenke, Résumé Suppl. 3: 24. 1962.

Nearly glabrous shrub, about 3 m. tall; branchlets obscurely tetragonal, the younger ones sometimes minutely puberulent, the ultimate ones about 3 mm. in diameter; leaves decussate-opposite; petioles 1.5--2 cm. long; leaf-blades chartaceous, subolivaceous, oblong-elliptic, 20--35 cm. long, 8--14 cm. wide, narrowed to the shortly but sharply acuminate apex, distantly undulate-dentate along the margins or entire at the lower part, narrowed to the acute base, shiny, glabrous and conspicuously pitted-glandular on both surfaces, with a few widely scattered disk-like and sessile glands beneath which are 0.5 mm. or less in diameter, the upper surface with numerous similar crowded glands at the very base; inflorescence cauline, sparingly pubescent, sessile during anthesis and 2--3.5 cm. wide, the flowers densely crowded, fascicled or depauperate-cymose, subtended by several suborbicular to obovate bracts, which are subcoriaceous, 8--9 mm. long, deciduous, rounded, with numerous sessile discoid glands on the outer surface; flowers 4-merous; pedicels about 5 mm. long, slightly pubescent; calyx cupuliform, 4 mm. long, subacute at the base, obscurely pubescent, the rim with 4 triangular obtuse teeth about 0.5 mm. long, usually with a few distant discoid glands near the rim; corolla white, milk-white, or cream-white, its tube 5 mm. long, glabrous, the lobes orbicular-ovate, subequal, about 3 mm. wide, rounded or obtuse at the apex; stamens 4; anthers oblong, 3 mm. long, slightly exserted, obscurely waxy-glandular; fruiting-peduncles distinct, stout, to 2.5 cm. long; fruiting-pedicels to 7 mm. long; fruiting-calyx cupuliform, membranous, glabrous; fruits ovoid, 5 mm. wide, glabrous, the lower 2/3 or 3/4 included by the fruiting-calyx.

The type of this species was collected by Maximo Ramos (no. 1395) on forested slopes at low altitudes, Batu Lima, near Sandakan, British North Borneo, and was deposited in the herbarium of the Bureau of Science at Manila, but is now destroyed. The type of f. clemensae was collected by Joseph and Mary Knapp Clemens (no. 29965) -- in whose honor it was named -- at the margin of a jungle, altitude 5000 feet, also in British North Borneo, flowering and fruiting in June, and is deposited in the Herbarium Bogoriense at Buitenzorg. The form looks quite distinct and may be worthy of nomenclatural recognition, but I have not yet been able to ascertain if or where it was formally described and published by Bakhuizen van den Brink.

Merrill (1923) says "A remarkable species remote from all hitherto described forms, but somewhat resembling Callicarpa cauliflora Merr. It is strongly characterized by its cauline, fascicled or depauperate-cymose, crowded flowers, the uniformly pitted upper and lower surfaces of its leaves, and the peculiar disciform glands widely scattered on the lower surface, crowded on the upper surface at the base of the leaf, and similar ones on the bracts (many) and on the calyces (few). The bracts are deciduous, but form a distinct involucre subtending the younger inflorescences."

Recent collectors describe the plant as a shrub or small tree, or as a "recumbent subtreelet", 5--20 feet tall, the trunk 1--12 inches in diameter, buds cream-colored, flowers borne on the trunk,

and fruit light-green or green to cream-green or cream-colored when immature, later pink, and finally red when mature, cauline. It has been found growing in open places and damp forests, at jungle margins, on flat land, banks, and jungle-covered hillsides, and along small streams and forest trails on hills, at 3000 to 5000 feet altitude, flowering in February, June, August, November, and December, and fruiting in January, March, June, and December. The flowers are said to have been "cream-white" on Clemens & Clemens 29965, "milk-white" on Endert 3651, and "white" on Boden-Kloss 19173, Clemens & Clemens 27651 & 28285, Pascual 1090, and M. Ramos 1395 & 1927.

Clemens & Clemens 27651 has a secondary fungus on the scale insects infesting the lower leaf-surfaces of this plant. Pascual 1090 exhibits especially narrow leaf-blades. Concerning Boden-Kloss 19173 Merrill comments: "in type the infl. (anthesis) is sessile. The axis elongates as the fls. are produced. See C. woodii Merr. which is probably involucrata."

Material has been misidentified and distributed in herbaria under the name Premna caulifera Stapf.

In all, 35 herbarium specimens, including the types of all the names involved, and 4 mounted photographs have been examined by me.

Citations: INDONESIA: GREATER SUNDA ISLANDS: British North Borneo: Boden-Kloss 19173 (Bz--17635, Ca--345867); Clemens & Clemens 27520 (Bz--17640, Ca--541964, N), 27651 (Bz--17638, Bz--17639, N), 28285 (Bz--17641, N), 28671 (Bz--17642), 29965 (Bz--17637, Ca--541963), 30541 (Bz--17643), 30711 (Bz--17646, N), 30711a (Bz--17646), 31306 (Bz--17645, Ca--559766, N), s.n. [Penibukan, Jan. 4, '33] (Ca--559765, N); Endert 3651 (A, Bz--72604, Bz--72892), 3742 (A, Bz--72602), 3836 (Bz--72603, N); Pascual 1090 (N); M. Ramos 1395 [field no. 324] (Bz--17636--isotype, N--photo of type, Ph--type, Z--photo of type), 1927 (Bz--17634, N, N--photo, Ph, Z--photo).

CALLICARPA IRIOMOTENSIS Masam., Trans. Nat. Hist. Soc. Formos. 25: 254. 1935.

Bibliography: Masam., Trans. Nat. Hist. Soc. Formos. 25: 254. 1935; A. W. Hill, Ind. Kew. Suppl. 9: 45. 1938; Moldenke, Phytologia 4: 451. 1953; Moldenke, Résumé 181 & 444. 1959; Moldenke, Résumé Suppl. 5: 6. 1962.

Shrub; branches spreading horizontally, ashy-gray, glabrate, scarcely lenticellate; branchlets dark, stellate-tomentose; leaves decussate-opposite; petioles about 3 mm. long, fuscous, stellate-tomentose, exstipulate; leaf-blades membranous, ovate or ovate-lanceolate, 4--10 cm. long, 2--3.5 cm. wide, acuminate or cuspidate-acuminate at the apex, dentate-serrate with apiculate teeth along the margins, cuneate at the base, stellate-tomentose on the midrib and venation, minutely glandular-punctate on the lamina, the dots red-purple when dry; cymes axillary, their branches slender, stellate-pubescent, and bracteate; bracts ovate, 1--1.5 mm. long; fruit

drupaceous, globose, 3--4 mm. long.

The type of this species was collected by Genkei Masamune on the island or Iriomote, Ryukyu Islands, on July 2, 1933. Recent collectors have found the species growing in the shade of large trees, in dense low scrubby forests, in wet gulch bottoms, and "occasional" in ravines at the sides of wet wooded gulches, at 120 to 175 meters altitude, fruiting in August.

In all, only 3 herbarium specimens have been examined by me.

Citations: WESTERN PACIFIC ISLANDS: RYUKYU ISLAND ARCHIPELAGO: Sakishima Islands: Iriomote: Walker & Tawada 6654 (N). Miyako: F. R. Fosberg 37191 (Z), 37289 (Sm).

CALLICARPA JAPONICA Thunb., Fl. Jap. 60--61 [as "iaponica"]. 1784; J. A. Murr. in L., Syst. Veg., ed. 14, 153. 1784 [not C. japonica Hort. ex Fritzel, 1866, nor "Thunb. auct." ex Raf., 1838].

Additional & emended synonymy: Callicarpa fol. serratis glabris Thunb. apud J. A. Murr. in L., Syst. Veg., ed. 14, 153, in syn. 1784. Callicarpa foliis oblongis acuminatis medio serratis glabris Willd., Linn. Sp. Pl. 1: 621, in syn. 1797. Callicarpa (japonica) foliis serratis glabris Thunb. apud Willd., Linn. Sp. Pl. 1: 621, in syn. 1797. Callicarpus japonica Thunb. apud Hassk., Cat. Pl. Hort. Bot. Bogor. Alt. 136. 1844. Callicarpus mimurazaki Hort. apud Hassk., Cat. Pl. Hort. Bot. Bogor. Alt. 136, nom. mud. 1844. Callicarpa murasaki Sieb., Jaarb. Konink. Nederl. Maatsch. Tuinb. [Ann. Hort. Pays-Bas] 1844: 25, nom. mud. 1844; Sieb. & Zucc., Abhand. Math.-phys. Cl. Köngl. Baier. Akad. Wiss. München 4 (3): 156. 1846. Callicarpa mimurasaki Hassk. apud Sieb. & Zucc., Abhand. Math.-phys. Cl. Köngl. Baier. Akad. Wiss. München 4 (3): 156, in syn. 1846. Callicarpa japonica f. parvifolia Miq., Cat. Mus. Bot. Lugd.-Bat. 70, nom. mud. 1870. Callicarpa longifolia var. japonica (Thunb.) Kuntze, Rev. Gen. Pl. 2: 503. 1891. Callicarpa mimurazaki Hassk. apud Jacks. in Hook. f. & Jacks., Ind. Kew. 1: 386, in syn. 1893. Callicarpa japonica var. typica H. J. Lam, Verbenac. Malay. Arch. 85. 1919. Callicarpa japonica var. typica Bakh., Bull. Jard. Bot. Buitenz., ser. 3, 3: 25. 1921. Callicarpa purpurea Nakai, Fl. Sylv. Kor. 14: 30, in syn. 1923 [not C. purpurea Hort. ex Lem., 1859, nor Hort. ex Moldenke, 1941, nor A. L. Juss., 1806, nor Van Houtte, 1932]. Callicarpa japonica f. glabra P'ei, Mem. Sci. Soc. China 1 (3): [Verbenac. China] 54. 1932. Callicarpa japonica Hort. (in part) ex Moldenke in Fedde, Repert. Spec. Nov. 40: 87, in syn. 1936; Prelim. Alph. List Invalid Names 11, in syn. 1940. Callicarpa murosaki Sieb. ex Moldenke in Fedde, Repert. Spec. Nov. 40: 88, in syn. 1936; Prelim. Alph. List Invalid Names 12, in syn. 1940. Callicarpa dichotoma var. koreana Hort. ex Moldenke. Prelim. Alph. List Invalid Names 10, in syn. 1940. Callicarpa shirasawana

Hort. ex Moldenke, Prelim. Alph. List Invalid Names 13, in syn. 1940 [not xC. shirasawana Mak., 1910]. Callicarpa japonica α subglabra Schau. ex Moldenke, Résumé 244, in syn. 1959. Callicarpa japonica var. japonica Kobayashi ex Moldenke, Résumé Suppl. 3: 30, in syn. 1962. Callicarpa japonica L. f. ex Moldenke, Résumé Suppl. 14: 7, in syn. 1966.

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Illustrations: Sieb., Jaarb. Konink. Nederl. Maatsch. Tuinb. [Ann. Hort. Pays-Bas] 1845: pl. 5 & 6 [in color]. 1845; Lindl. & Paxt. in Paxt., Flow. Gard. 2: 165, fig. 221. 1853; Hérincq, Hort. Franç., ser. 2, 3: pl. 4. 1861; M. T. Masters, Gard. Chron. 1871: 173, fig. 39. 1871; Shirasawa, Bull. Coll. Agric. Tokyo Imp. Univ. 2: pl. 14, fig. 10. 1895; Usef. Pl. Jap. 2: pl. 656 [in color]. 1895; C. K. Schneid., Dendrol. Winterst. 188. 1903; Shirasawa, Nippon Shinrin Jumoku Dzufu [Icon. Ess. Forest. Jap.] 2: pl. 70, fig. 1--10 [in color]. 1908; C. K. Schneid., Illustr. Handb. Laubholzk. 2: fig. 384c--e & 385h--l. 1911; Rehd. in L. H. Bailey, Stand. Cycl. Hort. 2: 628. 1914; G. V. Nash, Addisonia 3: pl. 103 [in color]. 1918; Nakai, Fl. Sylv. Kor. 14: pl. 6. 1923; Nakai, Trees & Shrubs Indig. Jap., ed. 2, 1: 452, fig. 214. 1927; Pammel & King, Proc. Iowa Acad. Sci. 35: 196, fig. 32. 1928; Schwencke, Zytol. Untersuch. Verbenac. fig. 12--14. 1931; Junell, Symb. Bot. Upsal. 4: 82, fig. 127. 1934; Patermann, Beitr. Zytol. Verbenac. pl. 5, fig. 8. 1935; Anon., N. Y. Times Spring Gard. Sect. 42, March 19. 1950; T. H. Everett, New Illustr. Encycl. Gard. 2: 296. 1960; Li, Morris Arb. Bull. 14: 4 & 6, fig. 1--6. 1963.

Recent collectors describe this as a shrub or low shrub, 0.6--3 m. tall, with a 1--1.7 m. spread and moderate relative growth rate, the stem 0.1--0.6 inches in diameter at breast height, the buds lavender, the flowers fragrant or odorless, and the fruit small, green when immature, then lilac, deep-lavender, or purple when ripe. The chromosome number is given as 2n = 16 or 18 [or even as "haploid chromosome number 18"]. The flowers are described as "lilac" on F. R. Fosberg 38215 & 38546, "deep-pink" on Dorsett & Morse 787, "pinkish-lavender" on F. R. Fosberg 38180, "reddish-purple" on Chung & Sun 204, "purplish" on Hurusawa 14-I, "light-purple" on Takenchi 14-C, "purple" on Chun & Sun 176 & 406, Hiroe 13906, Y. Kimura 14-B, Suzuki UC.699, E. H. Wilson 10411, and Yin 102, and "white" on Chiao 2617.

The plant has been found by recent collectors growing in shade or half-shade, in clay soil or in humus on mountainsides, in woods, on hilly ground and hillsides, coral rocks and rock cliffs, on seashores, at the edge of deciduous forests, and along roadsides in valleys, at altitudes from sealevel to 1500 meters, flowering from June to November, and fruiting from July to November. The Bakers make the interesting comment "anthers apparently splitting lengthwise in dehiscing, although a terminal pore may start it." Takenchi, Hottes, Van Melle, and others call the fruits "berries", but they are drupes; Yin calls the plant a "tree", while Chung & Sun refer to it as an "herb". Yin also refers to the flowers as being in a "spike". I feel that all these statements are errors in observation or terminology. E. H. Wilson reports the species as "common in thickets", while Fosberg found it to be "occasional" in

the undergrowth of scrub forests, in Pandanus scrub on limestone, in hedgerows between cultivated patches, and in rocky grassland with shrubs on the Ryukyu Islands.

It should be noted here that the C. japonica of "Hort. ex Pritzel", referred to in the synonymy above, is a synonym of C. rubella Lindl., while that on "Thunb. auct. ex Raf." is C. longifolia Lam. The C. purpurea of A. L. Jussieu is C. dichotoma (Lour.) K. Koch, that of "Hort. ex Moldenke" is C. longifolia Lam., while that ascribed to Van Houtte and to "Hort. ex Lem." is C. rubella Lindl.

The C. japonica angustifolia Kwa-wi, C. japonica f. angustata (Rehd.) Mizushima, C. japonica f. angustata (Rehd.) Ohwi, and C. japonica angustata Mattoon are all synonyms of C. japonica var. angustata Rehd., which see; C. japonica leucocarpa Aul, C. japonica f. leucocarpa (Sieb.) Rehd., C. japonica var. leucocarpa Nakai, C. japonica var. leucocarpa Sieb., and "C. japonica β C. leucocarpa Sieb." are all synonyms of C. japonica f. albibacca Hara; C. japonica var. angustifolia Savatier, C. japonica var. dichotoma Bakh., and C. japonica var. dichotoma (Lour.) Bakh. are C. dichotoma (Lour.) K. Koch; C. japonica f. latifolia Miq., C. japonica f. rugosior Miq., C. japonica subsp. luxurians (Rehd.) Masamune, and C. japonica var. kotoensis (Hayata) Masamune are all synonyms of C. japonica var. luxurians Rehd.; C. japonica var. luxurians f. leucocarpa Nakai is a synonym of C. japonica f. albifructa Hara; C. japonica f. rhombifolia Miq. is C. japonica var. rhombifolia H. J. Lam; C. japonica var. taquetii Nakai is a synonym of C. japonica var. taquetii (Léveillé) Nakai; and "C. japonica α C. erythrocarpa Sieb." is a synonym of C. japonica var. erythrocarpa Sieb. The hybrid between C. japonica Thunb. and C. mollis Sieb. & Zucc. (C. japonica x mollis Mak.) is known as xC. shirasawana Mak.

P'ei's C. japonica f. glabra was based by him on En 2505 from Diongloh and vicinity, on hilly ground, Fukien, China, collected in July, 1925, and on Tai 11793, collected in August, 1926, on rocky hillsides on Siongsai Island, 20 miles seaward from the mouth of the river Min, in the same province. He says of it "A typo differt, foliis ovato-lanceolatis, serrulatis, glabris....A nearly glabrous shrub, with a few stellate hairs when young. Leaves glabrous, glandular beneath, ovate-lanceolate, crenately toothed, shortly acuminate at both ends, about 11 x 3.2 cm., margins revolute, thickly chartaceous, lateral nerves about 8 on each side of the midrib. Petiole about 1.7 cm. long. Peduncle about 1.5 cm. in length; cymes lax. Calyx glabrous, with few glands, truncate. Anthers exserted. Corolla subglabrous, about 3 mm. long; corolla-tube twice as long as the calyx, filaments as long as the corolla-tube. Style subglabrous. Ovary subglabrous." Miquel (1870) based his f. parvifolia on one unnumbered specimen collected by Bürger and one collected by Siebold in Japan.

Hara (1948) and Merrill (1949) maintain that Amictonis japonica Raf. is a synonym of C. japonica Thunb., but I place it under C. longifolia Lam. Bakhuizen van den Brink (1921) includes C. brevipes (Benth.) Hance, C. dichotoma (Lour.) Raeusch., C. elegans Hayek, C. glabra H. J. Lam, C. gracilis Sieb. & Zucc,, C. jamamurasaki Sieb., C. longifolia var. brevipes Benth., C. oligantha Merr., C. purpurea A. L. Juss., C. serrulata Zipp., C. sieboldii Zipp., and Porphyra dichotoma Lour. in the overall synonymy of C. japonica, albeit not in the typical form of the species (which he calls C. japonica var. typica Bakh.), where he places only C. mimurazaki Hassk. and C. murasaki Sieb.

The Baileys (1935), Moldenke (1936), and Salisbury (1947) give C. arnoldiana Hort. as one of the synonyms of C. japonica, but it seems to me now that this is only another homonymous designation for the C. arnoldiana of Kelsey (1932), which, in turn, is a name that clearly applies to the C. bodinieri var. giraldii (Hesse) Rehd. introduced into our country through the Arnold Arboretum.

Numerous authors, including Nakai (1923), Moldenke (1936), and Hara (1948) reduce C. longifolia var. subglabrata Schau. (in part) to synonymy under C. japonica, but this trinomial was applied by Schauer to the typical form of C. longifolia Lam. and therefore belongs in the synonymy of that species regardless of what specimens he cited as representing it. Sprengel, on the other hand, in his 1825 work reduces C. japonica to synonymy under C. longifolia, but in his 1828 work he reinstates it as a valid species.

Lindley & Paxton (1853) make the following comments: "Siebold & Zuccarini have pointed out (Florae Japonicae familiae naturales, part 2, p. 30) the error committed by M. Schauer in referring this species to C. longifolia, a still less attractive plant, figured in the Botanical Register, t. 864, and now apparently lost in gardens. The form of the leaves is quite different, as are their serratures, which in fact are apt to disappear altogether in C. longifolia, whose cymes of flowers are smaller, with more conspicuous teeth to a firm and fleshy, not as in this case thin and membranous, calyx. C. longifolia is a southern plant, much more tender than this, which we believe occurs exclusively in Japan, whence we have wild specimens from Zuccarini, differing only in a looser and longer inflorescence and larger leaves."

Callicarpa japonica was actually first described by Thunberg in 1783 as "C. americana L.", a clear case of misidentification, later corrected by him. Nakai (1923) gives its general distribution as "Corea media et austr. Archipelago Koreano, Quelpaert et Dagelet... Yeso austr., Hondo, Shikoku ey Kiusiu." The specific name is often uppercased. Kawakami (1910) misspells the abbreviation for Thunberg's surname "Thumb." probably due to a typographic error.

Vernacular and common names recorded for C. japonica are "French mulberry", "guiou-saô-si", "jama-murasaki", "jama mura saki", "Japanese beautyberry", "japanische Schönbeere", "ko-mourassaki",

"méka-sogui", "mimurasaki", "mi-murasaki", "mi mura saki", "mi-murasaky", "mi-mura-saki", "mourassaki-skibou", "murasaki", "mura saki", "murasakishikibu", "murasaki-shikibu", "murasakisikibu", "murasaki-sikibu", "o murasaki-shikibu", "passakutenam", "tama-mourassaki", "tama-murasaki", "yabu-murasaki", and "yamamurasaki". Of these, "French mulberry" is applied also to all the other cultivated species of the genus; "Japanese beautyberry" is the recommended common name in English.

Rehder (1940) and Bean (1951) state that C. japonica was introduced into cultivation in 1845 [when Siebold introduced it into Holland]; Wisler (1942—1943) also gives the same date, but Van Melle (1947) maintains that it was introduced as early as 1841. Mattoon (1958) lists only 6 horticultural sources, but Bailey (1935) reports that at that time it was offered to the horticultural trade by H. P. Kelsey, Sanford, Brooklyn Botanic Garden, Katzenstein, Kew, Knap Hill, Eastern Nurseries (Holliston, Massachusetts), Cape Cod Nurseries (Falmouth, Massachusetts), Princeton Nurseries (Princeton, New Jersey), Bobbink & Atkins (Rutherford, New Jersey), Henry Hicks (Westbury, New York), Spring Hill Nursery (Tippecanoe City, Ohio), William N. Craig (Weymouth, Massachusetts), Weston Nurseries (Weston, Massachusetts), J. H. McFarland Breeze Hill (Harrisburg, Pennsylvania), and Thompson & Morgan (Ipswich, England). Wisler (1942—1943) reports the species in cultivation in Delaware County, Pennsylvania; I observed it growing in cultivation in Greak Neck, Nassau County, New York, on November 20, 1938, but did not make any collection of it. The New York Times (1950) states that "June bloom and clusters of fruit are more plentiful if [the] shrub is pruned in spring."

Santamour (1965) says "No explanation can be offered for the divergencies in basic number (x = 8, 9) [of the chromosomes] and in the ploidy of C. japonica (2x, 4x). However, the Verbenaceae contains many genera for which two basic numbers have been reported, even in the same species. The existence of diploid and polyploid forms in the same species is more common and may be the case in C. japonica." Personally, I would like to examine the herbarium vouchers (if any were kept!) of the specimens on which this cytological work was done. With the very widespread misidentification of specimens of this genus by botanists not specialists in the group, it seems very possible to me that misidentification may account for some of the discrepancies. Pammel & King (1928) report on germination studies of this plant and illustrate the appearance of the seedlings.

Gressitt 532 is anomalous, and the two Kinashi s.n. collections have the leaves gray-hairy. Tsui 601 is cited by me under C. dichotoma (Lour.) K. Koch, but the University of California specimen of this number certainly is not that species! The E. D. Merrill 11112, also cited by me under C. dichotoma, may likewise prove to represent C. japonica instead. Mizushima & Mori (1958) report that "A form approaching var. luxurians Rehd. is often found near the seashore" on the Shimokita Peninsula, Japan.

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CERTAMEN MELASTOMATACEIS XI.

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In continuing the routine adjustments needed in the Melastomataceae for the Flora de Venezuela, some long-delayed decisions have finally been forced upon me by the floristic exigencies. The account of the capsular-fruited tribes of the family has been essentially completed (which a votary might construe as evidence that the work of the past years has not been mere logomachy). Unfortunately for my innate desire for leisure, the Miconieae are barely begun. The usual distractive inflow of collections from elsewhere in tropical America has not ceased, so further Colombian and Peruvian novelties have been included here; cytologic leverage has even extruded some Mexican perpensions. Most of the novelties from Paul Hutchison's superb Peruvian collections have been given formal status; the material was gathered in 1963-1964 during the Seventh Botanical Expedition to the Andes of the University of California.

BUCQUETIA VERNICOSA Gleason

Originally described from Táchira (Venezuela) material, the species has also been collected in Depto. Santander, Colombia: 15 km west of Berlin, east of Bucaramanga, St. John 20604; Páramo de Santurbán, Cuatrecasas & Garcia Barriga 10320, Barkley & Araque 18S149. In both B. vernicosa and B. glutinosa (L.f.) DC., the calyx lobes are sometimes sparsely ciliolate (St. John 20604). I have not seen any collections of B. glutinosa from Santander, although the species apparently is common in Boyacá and Cundinamarca (and has also been collected at Aguadita, Tolima, Bro. L. Javier 20).

BRACHYOTUM CUTERVOANUM Wurdack, sp. nov.

B. campanulari (Bonpl.) Triana affinis, sed foliorum pubescentia subtus sparsiore, floribus in paniculis foliosis aggregatis, hypanthiis graciliter setulosis differt.

Trichomata laevia. Ramuli quadrangulati sicut petioli folia subtus inflorescentia hypanthiaque modice setulosi, pilis gracillimis plerumque 0.5-0.7(-1.2) mm longis. Petioli 0.4-0.8 cm longi; lamina 1.5-2.5(-3) X 0.7-1.1 cm tenuis ovato-elliptica apice acuto basi late acuta vel obtusa, 5(-7)-nervata nervulis subtus manifestis et laxe reticulatis, supra sparse vel modice et graciliter strigulosa. Flores 4-meri nutantes in dichasiis pluribus ramulorum apices versus aggregati; pedicelli 4-7 mm longi, ca. 0.5 mm diam., bracteolis 2-3 X 0.6 mm mox deciduis ca. 1 mm supra pedicellorum bases insertis. Hypanthium (ad torum) 3.5 X 2.5 mm; calycis tubus 0.6-0.8 mm altus, lobis 7-8(-11) X 1-1.3(-4) mm extus sparse strigulosis intus apicem

per 2.5-3 mm versus sparse strigulosis. Petala 15-15.5 X 8-9 mm subrhomboidea apice acuto ciliis caduce glanduliferis ca. 0.2 mm longis ornata. Stamina glabra, filamentis 4 mm longis, antheris 2.8-3.2 mm longis, connectivo ventraliter ad basim biappendiculato appendicibus ad thecis 0.4 mm liberis. Stylus 22 X 0.4 mm glaber; stigma punctiforme; ovarium apicem versus densiuscule strigulosum.

Type Collection: A. Sagástegui 5384 (holotype US 2469209; isotype TRP), collected at La Pucarilla along the road between Sócota and San Andrés, Prov. Cutervo, Depto. Cajamarca, Peru, elev. 2420 m, 24 May 1965. "Arbusto. Flores morada-oscuras, colgantes."

The lower leaf surfaces in B. campanulare are sericeous-strigose, the flowers are usually in simple dichasia with thick pedicels (ca. 1 mm diam.), and the hypanthia are densely loose-strigose; generally also, the older branchlet pubescence is appressed and the leaves are rigid rather than chartaceous. The quantitative pubescence distribution gives B. cutervoanum quite a different aspect from B. campanulare and the inflorescence is much like that of B. quinquenerve (R. & P.) Triana; the latter relative has narrowly lanceate and internally glabrous sepals, as well as appressed cauline hairs.

TIBOUCHINA HUTCHISONII Wurdack, sp. nov.

Sect. Diotanthera. T. incarum Gleason et T. stenopetalae Cogn. affinis sed inflorescentia pauciflora petalis maioribus differt.

Ramuli teretes sicut folia supra et foliorum subtus venae primariae modice strigulosi, pilis laevibus gracilibus 0.5-1(-2) mm longis. Petioli 0.2-0.9 cm longi; lamina 3-5(-7.5) X 0.8-1.5(2.5) cm lanceata apice gradatim breviterque acuminato basi late acuta, firme membranacea, subtus in venulis sparse strigulosa in superficie subglabra, 5-nervata vel paulo (ad 3 mm) 5-plinervata, nervorum pari exteriore debili incluso. Flores in dichasiis 1-3(-5)-floris terminalibus aggregati, dichasiorum bracteis 0.8-1.5 cm longis lanceatis persistentibus; flores 5-meri, pedicellis 2-3 mm longis sicut hypanthiis sparse glanduloso-setulosis, pilis ca. 1 mm longis, bracteolis ca. 1.5 mm longis ellipticis persistentibus ca. 1 mm infra hypanthii bases insertis. Hypanthium (ad torum) 4.5-5 mm longum; calycis tubus 0.5 mm altus, lobis 2-2.5 mm longis ovato-oblongis (apice rotundato) glanduloso-ciliolatis intus glabris. Petala 15-21 X 12-17 mm glanduloso-ciliolata obovata apice oblique rotundato. Stamina paulo dimorphica glabra, filamentis 7 vel 5 mm longis, antherarum thecis 5 vel 4 mm longis paulo subulatis rectis, connectivis 0.6-0.8 vel 0.3-0.5 mm prolongatis dorsaliter ad basim interdum tuberculatis lobis ventralibus 0.3-0.5 mm longis hebetibus. Stigma truncatum; stylus 13-14.5 X 0.5 mm glaber; ovarium modice setulosum pilis p. p. glanduliferis.

Type Collection: P. C. Hutchison, J. K. Wright, & R. M. Straw 6034 (holotype US 2469789; isotypes UC, USM), collected on wet steep banks at lower Boquerón del Padre Abad, Depto.

San Martín, Peru, elev. 480 m, 25 July 1964. "Flowers lilac pink."

Paratype: H. A. Allard 22102 (US), from Boquerón Pass between Tingo Maria and Pucallpa, San Martín, Peru, elev. 400 m. "Flowers rose-pink."

Tibouchina stenopetala has well-developed inflorescences with small (2-3 mm long) dichasial bracts and petals 6-7 mm long; T. incarum has 7-plinerved leaves, well-peduncled dichasia (the peduncle finely glandular-setulose), and petals 7-8 mm long. I have seen no authentic material of T. solmsii Cogn., but that Puno (Peru) species differs at least in the 7-nerved leaves, hypanthia with eglandular stout-based hairs, and petals 7-8 mm long. Among the collections of T. hutchisonii, well-developed leaves of 6034 are slightly plinerved but all visible leaves of 22102 are basally nerved.

TIBOUCHINA SANDIENSIS Wurdack, sp. nov. 3759

Sect. Diotanthera. T. molli (Bonpl.) Cogn. affinis, sed foliis floribusque minoribus differt.

Ramuli obscure quadrangulati sicut petioli folia subtus inflorescentia hypanthiaque pilis laevibus erectis 0.2-0.3 (-0.5) mm longis basim versus paulo expansis non glanduliferis dense obsiti. Petioli 0.4-0.8 cm longi; lamina 2-3.5 X 1-2 cm anguste ovata apice acuto basi obtusa vel rotundata, rigidiuscula et integra, supra modice strigosa pilis 1-1.5 mm longis, 5-nervata nervis exterioribus nervis interioribus 2-4 mm coalitis nervis secundariis 1-1.5 mm inter se distantibus supra invisis. Panicula multiflora 2.5-5 X 3-5 cm ramis divergentibus; flores 5-meri, pedicellis 2-3 mm longis, bracteolis 0.6-0.8 mm longis inconspicuis mox deciduis. Hypanthium (ad torum) 2.2 X 2 mm; calycis tubus 0.1 mm longus, lobis 1 mm longis deltoideis hebeti-acutis ad basim remotis intus glabris. Petala 5-5.5 X 2.6-3 mm elliptico-obovata ciliolata alioqui glabra, apice acutiusculo. Stamina isomorphica glabra; filamenta 4 mm longa; antherarum thecae 1.2 X 0.6 X 0.6 mm oblongae apice rotundato, poro 0.1 mm diam., connectivo 0.1 mm prolongato lobis ventralibus crassis 0.2-0.3 mm longis hebetibus. Stigma truncatum; stylus 9.5 X 0.35-0.2 mm glaber; ovarii apex sparsiuscule strigulosus, pilis 0.15-0.4 mm longis p. p. glanduliferis.

Type Collection: Ramón Ferreyra 16677 (holotype US 2469214; isotype USM), collected in low forest below Sandia, Depto. Puno, Peru, elev. 1800-1900 m, 13 May 1966. "Sufruticosa; flores morado-purpúreas."

Paratype: R. D. Metcalf 30606 (NY, US), from near Oconeque, Sandia, Puno, Peru, elev. 1800-2100 m, 22-25 May 1942. "Perennial herb growing from cracks of moist shaded rock wall; calyx red-green; petals purple; fruit red-green."

Tibouchina mollis has leaves 5-10 cm long, hypanthium 5-6 mm long and about equalled by the lobes, and anthers 4-5 mm long; in anther form, this north Andean species is the closest approach to T. sandiensis. I have not studied any of the collections cited in the Flora of Peru as T. mollis, but feel sure that they are

all referable to other species. Tibouchina dimorphophylla Gleason has pubescence similar to that of T. sandiensis, but much larger leaves and flowers as well as attenuate anthers. Tibouchina longifolia (Vahl) Baill. has longer and proportionately narrower leaves, longer stem pubescence and calyx lobes, and larger anthers somewhat attenuate at the apex. Both the other Puno species in this general alliance, T. gayana (Naud.) Cogn. and (ex char.) T. solmsii Cogn. have larger and apically attenuate anthers as well as vegetative differences.

TIBOUCHINA BREEDLOVEI Wurdack, sp. nov.

T. durangensi Standl. distanter affinis, sed foliis minoribus pubescentioribus floribus 4-meris differt.

Ramuli acute quadrangulati sicut folia utrinque sparse strigulosi, pilis laevibus 0.5-1 mm longis. Petioli 0.2-0.5 cm longi; lamina 1.5-2.5 X 0.5-1 cm elliptica vel paulo ovato-elliptica utrinque acuta subcoriacea, trinervata nervis secundariis supra invisis subtus obscure evolutis nervulis invisis. Panicula submultiflora usque ad 8 X 6 cm, ramulis pedicellis hypanthiisque modice glanduloso-setulosis, pedicellis ca. 3 mm longis, bracteolis ca. 1 mm longis lanceatis caducis. Hypanthium (ad torum) 4 X 2.5 mm; calycis tubus 0.4 mm altus, lobis 2-2.2 X 1.7 mm triangularibus, extus glanduloso-setulosis, intus glabris. Petala 6.2-6.8 X 5-5.3 mm, obovata, apice rotundato, apicem versus subsparse ciliolata, pilis p. p. glanduliferis. Stamina dimorphica glabra, filamentis 6.2 vel 5.5 mm longis, thecis oblongo-subulatis poro ventraliter inclinato 0.2 mm diam. Stamina maiora: thecae 5 mm longae, connectivo 2.5 mm prolongato, appendicibus ventralibus 1.5 X 0.5 mm hebetibus. Stamina minora: thecae 3.8 mm longae, connectivo 0.3 mm prolongato, appendicibus ventralibus 1 X 0.6 mm hebetibus. Stylus 7 X 0.5-0.2 mm glaber; stigma punctiforme; ovarium 4-loculare, apice ipse pilis ca. 20 et 0.4-1 mm longis glanduliferis coronato. Semina 0.5 X 0.3 mm cochleata muriculata.

Type Collection: D. E. Breedlove 10060 (holotype US 2469207; isotype DS), collected on a slope with Pinus and Quercus at Lago de Montabello, 40 km east of La Trinitaria, Municipio La Trinitaria, Chiapas, Mexico, elev. 1600 m, 27 May 1965. "Flowers purple; 3 feet tall."

Paratypes (both topotypical): Breedlove 9693 and Rzedowski 715.

Tibouchina durangensis has leaf blades below the inflorescence 4-7 X 1.5-2.5 cm, these very sparsely loose-strigulose above; the flowers are 5-merous and the ventral connective lobes of the stamens are 1 X 0.7 mm. I have had qualms as to the proper generic disposition of both T. breedlovei and T. chiapensis; certainly both are suggestive of Heterocentron in their large stamens, but the foliar features and the definite ventral lobes on the connectives of the small stamens indicate Tibouchina. Neither novelty seems to belong, other than in the technicality of 4-merous flowers, in Tibouchina Sect. Pseudopterolepis, but rather with those 5-merous Mexican species with

long ventral lobes at the connective base, such as T. galeottiana (Naud.) Cogn. and an unpublished species of Gleason based on Orcutt 3939. While the 4-merous flowers might also indicate that placing them in Pterolepis should be considered, there are no branched intercalycine hairs in either of these anomalous novelties and the stamens are quite different from those of Pterolepis.

TIBOUCHINA CHIAPENSIS Wurdack, sp. nov.

T. breedlovei Wurdack distanter affinis, sed ramulorum hypanthiorumque pilis minute barbellatis foliis latioribus differt.

Frutex, pilis ubique sparse vel modice minuteque barbellatis; ramuli teretes vel inconspicue rotundato-quadrangulati sicut petioli laminarum venae primariae subtus dense longo-strigulosi. Petioli 0.7-1 cm longi; lamina 2.5-4.5 X 1.5-3 cm elliptico-ovata apice late acuto vel obtuso basi obtusa, firme membranacea, supra sparse vel modice strigulosa, subtus modice strigulosa, trinervata nervis secundariis supra obscuris subtus paulo elevatis nervulis subtus laxe reticulatis. Inflorescentia sub-multiflora ca. 4 cm longa lataque sicut pedicelli hypanthia sepalaque appresso-setulosa pilis 0.5-1 mm longis glanduliferis; flores 4-meri, pedicellis 3-5 mm longis, bracteolis ca. 3 mm longis lanceato-linearibus caducis. Hypanthium 4-4.5 mm longum; calycis lobi 3-3.2 mm longi, anguste oblongo-triangulares per-sistentes. Petala 8.5 X 7 mm suborbicularia densiuscule glandu-loso-ciliolata ut videtur rosea. Stamina dimorphica glabra; filamenta 8 vel 6.5 mm longa, antheris oblongo-subulatis. Stamina maiora: thecae 5-5.5 mm longae ut videtur purpureae, connectivo 3-3.5 mm prolongato, appendicibus ventralibus 1.8-2 X 0.3-0.4 mm hebetibus. Stamina minora: thecae 3.8 mm longae ut videtur flavae, connectivo 0.6-1 mm prolongato, appendicibus ventralibus 1.2-1.6 X 0.3 mm hebetibus. Stylus 10 X 0.3 mm glaber; stigma punctiforme; ovarium 4-loculare, apice modice glanduloso-setuloso.

Type Collection: T. MacDougall s. n. (Matuda Herbarium 26064) (holotype US 2364170), collected near Monserrate, Chiapas, Mexico, 9 March 1952.

Paratypes: C. A. Purpus 10200 (April, 1925) and 10627, both from mountain slopes, Fénix, Chiapas, Mexico.

Tibouchina breedlovei has smooth hairs and leaf blades only 0.5-1 cm. wide. The fruiting Purpus collections had been filed under Monochaetum but excluded from that genus by Gleason. The plumulose hairs and the foliage of T. chiapensis are somewhat suggestive of those of Monochaetum pulchrum Dcne.; that species can be distinguished vegetatively by the patent cauline pubescence.

MONOCHAETUM TACHIRENSE Wurdack, sp. nov.

M. bonplandii (Kunth) Naud. affinis, sed caulis et foliorum subtus pilis appressis praeditis, sepalis ovato-lanceatis acutis differt.

Ramuli paulo quadrangulati sicut petioli foliorum laminae utrinque inflorescentia hypanthiaque modice strigulosi, pilis laevibus gracilibus 0.5-1 mm longis, in nodis gracili-setosi, pilis paulo appressis 1-1.5 mm longis. Petioli 0.4-0.7 cm longi; lamina 2-3 X 0.8-1.2 cm lanceato-elliptica apice anguste acuto basi acuta, 5-nervata, nervorum pare interiore subtus costam per 1-2 mm parallelo, supra pilis ca. 15 per mm quad. aequaliter obsita. Flores in dichasiis terminalibus 3-5-floris dispositi; pedicelli 0.8-1.1 cm longi. Hypanthium 6-7 mm longum; sepala 4.7-5.2 mm longa ovato-lanceata acuta post anthesim persistentia. Petala 12-15 X 8-9.5 mm obovata rotundata. Stamina glabra, filamentis 6-7 mm longis. Stamina maiora: antherarum thecae 12 mm longae, appendice dorsali 4-4.5 X 0.6 mm complanata, apice hebeti-acuto. Stamina minora: antherarum thecae 2.5-3.5 X 0.1-0.2 mm lineares steriles, appendice dorsali 1.3-2 X 0.2-0.3 mm apice hebeti-acuto. Stylus 15 X 0.3 mm; ovarii apex pilis usque ad 1.2 mm longis modice armatus.

Type Collection: J. A. Steyermark 57126 (holotype VEN 10545; isotype US), collected in wet thickets between El Cobre and Cordero, Edo. Táchira, Venezuela, elev. 1520-1820 m. 8 July 1944. "Shrub 5 feet tall; leaves deep green above, silvery below; petals deep rose-orchid as are filaments and style."

I am somewhat dubious as to the exact relationships of M. tachirense, the pubescence density and rather tardily deciduous sepals suggesting an alliance with M. bonplandii and the leaf and sepal shapes perhaps indicating affinity with M. meridense (Kl. ex Karst.) Naud.; hybrid origin might be considered, but field observations are needed. Monochaetum bonplandii differs in its dense patent pubescence on the branchlets and lower leaf surfaces, as well as in the ovate-oblong sepals; M. meridense has much sparser vegetative pubescence and early-caducous sepals. The type collection of M. tachirense had previously been determined as both M. brevifolium Gleason and M. humboldtianum (Kunth & Bouché) Kunth ex Walpers; M. humboldtianum has the connective appendages of both large and small stamens as long as or slightly exceeding the anthers, as well as early-caducous sepals and larger petals.

MONOCHAETUM VILLOSUM Gleason subsp. VENEZUELENSE Wurdack, subsp. nov.

Hypanthium glabrum; calycis lobi ciliati; tori regio extus glabra.

Type Collection: F. J. Breteler 3370 (holotype NY; isotypes US, VEN), collected in moist shade along road to Barinas 79 km from Mérida (apparently ca. Estados Mérida-Barinas boundary), elev. 2800 m, 21 Nov. 1963. "Shrublet 60 cm tall. Petioles dark red; leaves herbaceous, slightly glossy and medium green above, paler and dull below. Calyx green. Corolla white. Filaments white; anthers yellow."

The typical subspecies of M. villosum, still known only from the Colombian (Huila) type collection, has evenly fine-setose hypanthia with a zone of setae at the torus line. The other

Venezuelan species of Gleason's group Dicranantherae, M. jahnii Pittier, resembles M. villosum subsp. venezuelense in its glabrous hypanthia, but has a dense zone of toral hairs externally at the hypanthial apex, pink (rather than white) petals, and a glabrous ovary. Breteler 3370 shows a distinct crown of gland-tipped ovarial hairs up to about 1 mm long. In his original description of M. villosum, Gleason noted that the hypanthial hairs in part were caducously gland-tipped; his key in the treatment of the South American species is therefore misleading. Perhaps M. villosum will not be maintained as specifically distinct from M. glanduliferum Triana when more collections are available; for the present, however, the eglandular vegetative hairs and longer cauline pubescence can serve to separate the Huila species from the earlier-described one.

RHYNCHANTHERA CARDONAE Wurdack, sp. nov.

Sect. Anisostemones. A speciebus 17-19 Monographiae Cogniauxii differt foliis supra sparsissime gracili-setosis glabrescentibus.

Suffrutex paulo ramosus; ramuli quadrangulati sicut petioli inflorescentiaque sparse setosi (pilis gracilibus caduce glanduliferis 1.5-2.5 mm longis) et densiuscule caduceque setulosi (pilis plerumque 0.2-0.3 mm longis) ad nodos densiuscule gracili-setosi. Petioli 0.5-1.2 cm longi; lamina (3.5-)5-7.5 X (1-)1.5-2.5 cm lanceata apice anguste acuto, basi obtusa vel rotundata, firme membranacea, supra primum sparsissime brevi-setosa demum glabrata, subtus praecipue secus nervos sparse gracili-setosa pilis p. p. minore caduce glanduliferis, 5-nervata (nervorum pare debili inframarginali neglecto), distincte crenato-serrulata, dentibus ca. 8 per cm et 0.3-0.8 mm altis setuliferis. Inflorrescentia anguste thyrsoideo-paniculata foliolosa usque ad 23 cm longa, ramis brevibus plerumque 3-4 cm longis bracteosis ca. 5-floris; flores breviter (1-2 mm) pedicellati. Hypanthium (ad torum) 5.7-6 mm longum sicut sepala dense glanduloso-setulosum, pilis gracilibus 0.6-1 (in calyce ad 2) mm longis; calycis tubus 0.3 mm altus, lobis 11 X 1.8 mm subulatis. Petala ut videtur rubro-purpurea 15-18 X 9 mm rhomboideo-obovata apice late acuto, marginibus apicem versus glandulis sessilibus ornatis. Staminum maiorum: filamentum 7 mm longum; antherae thecae 6.8 mm longae, rostro 4.5 mm longo, connectivo 7 mm prolongato 1.4 mm lato. Stamina minora: filamenta 5 mm longa; antherarum thecae 6.8 mm longae, rostris 3 mm longis, connectivis 2.8 mm prolongatis 0.4 mm latis ventraliter paulo (0.4 mm) tuberculatis. Staminodia 3.2 X 0.2 mm linearia. Stylus 13 X 0.7-0.3 mm glaber; ovarium 3-loculare, apice inconspicue puberulo, pilis 0.1-0.3 mm longis.

Type Collection: F. Cardona 2858 (holotype VEN; isotype NY), collected "en playa, Salto Río Ichún, Alto Paragua," Edo. Bolívar, Venezuela, elev. 380 m, 1 March 1958.

The three postulated relatives have the upper leaf surfaces persistently and evenly fine-strigose; perhaps the closest of the trio is R. haenkeana DC., for which two recent collections from northern Peru (San Martín) are Loriega s.n. and Woytkowski 6117.

Other species placed in this alliance by recent describers are R. linearifolia Hoehne and R. riparia S. Moore; the former differs in the much narrower leaves (1-1.3 cm wide) and the flowers with relatively shorter rostra on the anthers; the latter (ex char.) has evenly strigose leaves and smaller flowers with "subsetaceous" calyx lobes. Among the related species-group characterized by Cogniaux as subeglandulose, R. verbenoides Cham. differs (ex char.) in the stout petioles, rigid and relatively narrower leaves, and "subglabrous" calyx lobes. The floral dimensions given for R. cardonae are from a flower bud just before anthesis; thus the filaments and style are probably somewhat immature.

RHYNCHANTHERA APURENSIS Wurdack, sp. nov.

Sect. Anisostemones. R. secundiflorae Naud., R. leucorrhizae S. Moore, et R. cacerensi Hoehne affinis, differt floribus minoribus.

Ramuli quadrangulati sicut inflorescentiae hypanthiaque modice glanduloso-setulosi, pilis gracilibus 0.5-1 mm longis. Folia inferiora delapsa; foliorum superiorum petioli 0.3-0.8 cm; lamina 2-3.5 X 1-1.5 cm, ovata vel elliptico-ovata apice acuto basi obtusa vel rotundata, membranacea et serrulata, utrinque primum sparse setulosa demum nervis primariis subtus exceptis glabrata, 5-nervata. Inflorescentia ramosa, ramis usque ad 15 cm longis foliolosis secundifloris; flores singuli, pedicellis ca. 0.5 (demum in statu fructifero ca. 1) mm longis. Hypanthium (ad torum) 3.5 mm longum; calycis tubus 0.3 mm altus, lobis 2-2.2 (in statu fructifero ca. 2.7) X 1 mm oblongo-triangularibus densiuscule glanduloso-setulosis. Petala 7-7.5 X 4.5 mm oblongo-obovata, apice late acuto et glanduloso-ciliolato setis paucis gracilibus 0.3-0.5 mm longis. Staminum maiorum: filamentum 4.5 X 0.6 mm; antherae thecae 4 X 1.5 mm, rostro 1.5 X 0.2-0.3 mm, connectivo 5 mm prolongato 0.7 mm lato. Stamina minora: filamenta 3.5-3.7 X 0.4-0.6 mm; antherarum thecae 3.8-4 X 1.2 mm, rostris 1.5-1.8 X 0.2-0.3 mm, connectivis 2.5-3 mm prolongatis 0.3-0.4 mm latis basi ipsa paulo expansa. Staminodia 2.3 X 0.1-0.15 mm linearia. Stylus 12 X 0.4 mm glaber; stigma paulo expansum 0.7 mm diam.; ovarium 3-loculare, apice inconspicue glanduloso-puberulo pilis 0.1-0.2 mm longis.

Type Collection: Leandro Aristeguieta & Getulio Agostini 4130 (holotype US 2324167; isotype VEN), collected in the region of the Selvas de San Camilo, between Guacas and Guasdualito, Edo. Apure, Venezuela, March 1960. "Planta fruticosa, alrededor 1 m alta. Flores moradas."

All three relatives (ex char.) have petals 13-25 mm long and anther rostra 3-5 mm long. Rhynchanthera secundiflora, from Paraguay, has subulate calyx lobes about as long (4-5 mm) as the hypanthia. The two Brazilian relatives, with anther rostra about as long as the thecae, are from the same region, near São Luiz de Caceres in the Rio Paraguai drainage of Mato Grosso; the descriptions are so similar that these taxa may well be synonymous. The direct affinity of each of the two newly

described Venezuelan species with austro-Amazonian taxa, rather than with those from northern South America, is striking.

ADELOBOTRYS DC., Prodr. 3: 127. 1828.
Davya DC., Prodr. 3: 105. 1828.
Xeracina Raf., Sylva Telluriana 98. 1838.

To Adelobotrys, de Candolle originally ascribed only A. scandens (Aubl.) DC. (Melastoma scandens Aubl.). Under Davya, he listed four species in the following order: D. paniculata DC., D. glabra DC., D. guianensis DC., and D. peruviana DC.; of these, the first two were transferred in 1871 by Triana to Meriania, while the latter two were synonymized by him under A. adscendens (Sw.) Triana. Gleason (1932) distinguished A. guianensis (DC.) Gleason from A. adscendens by anther structure.

In his discussion of Davya (Mem. Melast. 17. 1829), de Candolle indicated the generotype as D. guianensis by his comment: "J'ai primitivement établi ce genre sur une espèce recueille à la Guiane française par Patris, et qui fait partie de mon herbier. Dès-lors, j'en ai trouvé une seconde espèce.....; et deux....". Naudin was apparently the first taxonomist subsequent to de Candolle to consider the possible synonymy of the two genera described in the Prodromus. In his treatment of Davya, he placed in Sect. Eudavya D. glabra DC., D. claussenii Naud., and D. calyptrata Naud.; in Sect. Adelobotrys (Naud.) DC. were placed D. ciliata Naud. and D. scandens (Aubl.) Naud. Naudin apparently had not seen the Patris type collection of D. guianensis DC., commenting at the end of the treatment of Davya (under Species fortassis addendae): "10. D.? guyanensis DC., l.c.--Nonne species affinis D. ciliatae?" Both Triana and Cogniaux subsequently treated Davya as a section of Meriania and Adelobotrys as a genus.

Naudin's failure to include D. guianensis in his Sect. Eudavya renders illegitimate his choice of the generic name Davya rather than Adelobotrys (International Code, Article 48). Therefore, the use of Adelobotrys by Triana, Cogniaux, and Gleason can be upheld. Dr. Gleason in his melastome notes implied his awareness of this nomenclatural turmoil and wrote: "There is little sense in bringing it up again." I am following in the tradition of Triana and his successors in the Melastomataceae by using the spirit and substance of the International Code to avoid wholesale transfers. While Davya thus has no status as a section in Meriania, there is no need at present to coin a new subgeneric name since Cogniaux' species alignment in Swartz's genus surely needs adjustment.

The gender of the generic name Adelobotrys was not established by de Candolle. Triana's usage was feminine, with the apparent choice of the latinized form of "botrys" rather than the identical Greek masculine word. R. C. Foster and H. W. Rickett have both told me that there is no classical reason that Triana's usage should not be followed; however another respected botanical classicist, because the first part of the word, "Adelo-" is Greek, has disagreed with this interpretation.

In describing the genus Xeracina, Rafinesque placed there definitely three species of Aublet: Melastoma villosa, M. aquatica, and M. scandens. The first two of these were later (1849) placed by Naudin in his monotypic genera Desmoscelis and Nepsera. The third species had already (1828) been used by de Candolle as the generotype of Adelobotrys. To avoid displacing either of Naudin's names for widespread species, X. scandens (Aubl.) Raf., Sylva Telluriana 98. 1838, is herewith designated as the generotype of Xeracina Raf. The generic description of Xeracina is sufficiently vague (and also quite inaccurate in "bacca exsuca") that no taxonomic evaluation is needed as to Rafinesque's generotypic concept.

GRAFFENRIEDA SIPAPOANA Wurdack, sp. nov.

G. sessilifoliae Triana affinis, sed foliis bene petiolatis septuplinervatis differt.

Arbor parva; ramuli hebeti-quadrangulati sicut folia subtus inflorescentia hypanthiaque primum densiuscule furfuracei, pilis nigro-rufis crassis barbellatis 0.1-0.2(-0.3) mm longis erectis, demum glabrescentes. Petioli 4-7 cm longi ad apicem vel paulo infra bigibbosi, gibbis ellipsoideis vel sphaericis 2-5 mm longis hebetibus; lamina (8-)12-18 X (5-)8-14 cm, elliptico-ovata vel oblongo-elliptica, apice rotundato vel late hebeti-obtuso, basi ca. 3-5 mm cordulata, coriacea et integra vel obscure crenulata dentibus ca. 4 mm inter se distantibus et 0.1-0.2 mm altis, 7-9-plinervata nervorum pare intimo (2-)3-4 cm supra basim inserto pare intermedio 1-1.5 cm supra basim inserto paribus ceteris exterioribus basalibus nervis secundariis 4-8 mm inter se distantibus subtus creberrime elevatis nervulis planis laxiuscule reticulatis areolis irregularibus ca. 0.5-1 mm latis, supra glabra, subtus in superficie sparse resinoso-glandulosa. Panicula fructifera 15-30 cm longa multiflora; pedicelli 3-5 mm longi, 1-1.5 mm diam.; flores ob tori cicatrices evidenter 5-meri. Hypanthium (ad torum) 7-8 X 6 mm; torus membrana fimbriata paulo indurata armatus; calyx evidenter in lobis 2-3 ovatis 3-4 mm longis persistentibus fissus, tubo torum supra ca 1 mm longo. Capsula trilocularis, apice in tubum 2.5 mm longum laceratum prolongato, dentibus 0.3-0.5 mm longis; semina numerosa 1-1.2 X 0.2-0.3 mm, recta laevia paulo angulata.

Type Collection: B. Maguire & L. Politi 28478a (holotype NY; isotypes US, VEN), collected in the savanna of Campo Grande, Cerro Sipapo, Terr. Amazonas, Venezuela, elev. 1370 m, 20 Jan. 1949.

Paratype: Maguire & Politi 28272, from Caño Profundo, near Caño Negro, Cerro Sipapo, elev. 1460 m, 10 Jan. 1949.

Graffenrieda sessilifolia has pubescence, foliar texture and venulation, calyx lobes, and (in subsp. occidentalis Wurdack) ovarial features as in the Sipapo species, but sessile 5-7-nerved leaves. Another probable distant relative is G. rotundifolia (Bonpl.) DC., with 3-nerved leaves, truncate calyx, and rather blunt apical lobes on the ovary. Because of differences in the foliar venulation and pubescence, I do not believe that

G. sipapoana is closely related to G. rupestris Ducke; that species has a 5-celled ovary with similar apical teeth. Despite the distinctive leaves, the description of G. sipapoana has been long postponed because of the lack of flowering material (cf. Mem. N. Y. Bot. Gard. 8: 136. 1953, sub G. versicolor); however the hope for such collections has become progressively dimmer, with no immediate prospect of anyone visiting the Sipapo cumbre during the inimical late rainy season. The nodular protuberances at the petiole apices of the Sipapo tree are reminiscent of those found in the Ecuadorian Miconia gibba Markgraf.

GRAFFENRIEDA LATIFOLIA (Naud.) Triana subsp. MERIDENSIS Wurdack, subsp. nov.

Folia 5- vel indistincte 7-nervata. Petala acuta.

Type Collection: A. L. Bernardi 1025 (holotype NY), collected in cloud-forest at La Carbonera, Edo. Mérida, Venezuela, elev. 2300 m, 24 Oct. 1953. "Arbol de 4-5 m de alto."

Paratypes (all Edo. Mérida): Bernardi 383, Cerro El Toro, elev. 2200 m; Bernardi 2258, Pueblos del Sur, elev. 1800-1900 m; Steyermark 56018, Cerro San Isidro, above La Carbonera, elev. 2430-2475 m; Steyermark 56490, Canagua-El Molino, elev. 2530-2715 m.

The typical subspecies, known from the West Indies, Trinidad, and the Venezuelan coastal cordillera (Aragua, Distrito Federal, Miranda), has 7-9-nerved (and generally larger) leaves and apically rounded petals. The related G. emarginata (R. & P.) Triana, apart from the relatively heavy pubescence and definitely 4-celled ovaries, resembles G. latifolia.

SALPINGA GLANDULOSA (Gleason) Wurdack, comb. nov.

Macrocentrum glandulosum Gleason, Bull. Torrey Club 58: 422. 1931.

SALPINGA PUSILLA (Gleason) Wurdack, comb. nov.

Macrocentrum pusillum Gleason, Bull. Torrey Club 58: 422. 1931.

My doubts concerning the original generic disposition of these two Guayana species (Phytologia 9: 417. 1964) have been confirmed during a study of Venezuelan Bertolonieae. Both species have dimorphic anthers with large blunt appendages which are erect, quite in accord with the stamens of S. secunda DC. (the generotype), S. dimorpha (Gleason) Wurdack, and S. maranonensis Wurdack; the species of Macrocentrum have essentially isomorphic stamens with subulate descending spurs.

MACROCENTRUM STEYERMARKII Wurdack, sp. nov.

M. rubescenti Gleason et M. minore Gleason affinis, sed pedicellis longioribus differt.

Herba pusilla 7-15 cm alta; ramuli sicut petioli modice setulosi, pilis gracilibus caduce glanduliferis 0.7-1 mm longis. Petioli plerumque 3-8 mm longi; laminae membranaceae in quoque jugo aequales vel paulo (1:1.5) inaequales raro valde dispariles,

in folia matura ut videtur uninervatae sed in folia juvenilia inconspicue trinervatae, nervis secundariis tertiariisque laxe reticulatis satis inconspicuis, plerumque 1.2-2.4 X 0.7-1.3 cm, ellipticae, apice late acuto vel obtuso, basi late acuta, glanduloso-ciliolatae et integrae vel inconspicue serrulatae, supra costam versus glabrae margines versus sparse glanduloso-setulosae, subtus sparsissime glanduloso-setulosae. Flores 4-meri in ramulis terminales demum laterales plerumque solitarii; pedicelli ad anthesim 7-10 mm longi graciles ca. 1 mm infra hypanthii basim articulati et bibracteolati, bracteolis 1-1.5 X 0.1-0.2 mm, linearibus, infra articulum modice glanduloso-setulosi. Hypanthium (ad torum) 1.5 mm longum 8-costatum sparse glanduloso-setulosum; calycis tubus 0.3 mm altus, lobis oblatis 0.7-0.8 X 1.7 mm secus margines glandulis instructis, dentibus exterioribus hebetibus paulo (0.1 mm) eminentibus. Petala 5-5.5 X 2.4 mm oblonga apice rotundato et setula glandulifera unica ca. 0.2 mm longa armato. Filamenta ca. 2 mm longa; antherarum thecae ca. 2 mm longae, connectivo infra loculos ca. 0.3 mm prolongato, appendice dorsali descendente acuta 0.6 mm longa. Stylus ca. 5 X 0.2 mm; stigma non expansum; capsula 3-locularis.

Type Collection: Bassett Maguire, Julian A. Steyermark, & Celia K. Maguire 53864 (holotype VEN; isotypes NY, US), collected on top of moist west-facing escarpment, Cerro Uroi, Río Uroi, drainage of Río Chicanán, 6°15'N, 61°50'W, Edo. Bolívar, Venezuela, 13 Sept. 1962. "Locally frequent. Flowers white."

Macrocentrum rubescens has pedicels 2-3 mm long, branchlet internodes glabrous, and petals 9-11 mm long. Macrocentrum minus vegetatively is like M. steyermarkii but has pedicels only 1-1.5 mm long, as well as esetulose petals. More distantly related is M. vestitum Sandwith, with pedicels like those of the Uroi species but upper leaf surfaces evenly setose and petals pink-flushed and with an apical seta 0.5-0.8 mm long. The staminal dimensions given for M. steyermarkii are from a mature bud.

MICONIA INGENS Wurdack, sp. nov.

M. brachycalyci Triana, M. centronioidi Gleason (ex char.), et M. megalanthae Gleason affinis, sed foliis supra laxe strigulosis differt.

Ut videtur arbor. Ramuli sulcato-quadrangulati sicut petioli inflorescentia hypanthiaque indumento amorpho-squamuloso appresso dense induti. Petioli 4.5-11 cm longi; lamina (caudam exclusa) 15-35 X 12-25 cm apice per 1.5-2.5 cm caudato-acuminato basi paulo (0.7-1 cm) cordata, membranacea et integra vel obscure undulato-serrulata, supra modice longo-strigulosa, pilis 0.7-1.3 mm longis laevibus gracilibus laxiusculis 1-2 per mm. quad., subtus in venis venulisque primum modice squamulata demum glabrata in superficie primum sparse resinoso-granulosa demum glabra, 7-nervata, nervis secundariis plerumque 0.5-1 cm inter se distantibus nervulis subtus paulo elevatis et reticulatis areolis ca. 0.3 mm latis. Panicula 22-26 cm longa submultiflora, pedicellis 2 mm longis incrassatis ad apices bibracteolatis, bracteolis 2.5-3 mm longis anguste ovatis usque ad anthesim

persistentibus; flores 5-meri. Hypanthium (ad torum) 4 X 3 mm; calycis tubus 1.7-2 mm altus, lobis 0.5-0.7 X 4 mm oblatis apice rotundato, dentibus exterioribus vix elevatis nec liberis nec eminentibus. Petala 16-18 X 14-16 mm, extus dense amorpho-squamulosa obovata, apice rotundato et plerumque paulo emargi-nato. Stamina isomorphica; filamenta 9-10 mm longa modice glanduloso-puberula, pilis 0.1 mm longis; antherarum thecae 6.7-7.5 X 1.2 X 1 mm, poro ventraliter inclinato 0.3 mm diam., connectivo basaliter per 4.5-5.5 mm dense glandulis sessilibus juxta thecas obsito, dorsaliter prope basim per 3 mm paulo elevato ad basim dorsaliter dente hebeti glabro 0.2-0.3 mm longo ornato. Stigma capitellatum 1.6 mm diam.; stylus 17.5 X 1.1-0.8 mm basim versus per 3-4 mm densiuscule glanduloso-puberulus in ovarii apicem 0.5 mm immersus; ovarium 3(?)-loculare 1/2 inferum glabrum.

Type Collection: Kjell von Sneidern 751 (holotype S), collected in primaeval forest at La Costa, El Tambo, Depto. Cauca, Colombia, elev. 1000 m, 24 June 1936.

Paratype: von Sneidern 787, from the same locality, 7 Sept. 1936.

The three suggested relatives have the general floral features of M. ingens, including puberulent hypanthia and petals, large petals, expanded stigmas, and glandular anther connectives; all, however, have the leaves glabrous above at maturity (more-or-less stellulate-lepidote when young) and with acute bases. Miconia centronioides (ex char.) has glabrous filaments and style and (as in M. brachycalyx) the connective glands only near the thecae bases. More distantly related is M. axinaeoides, with a punctate stigma, and oblong-obovate leaves which are glabrous above. The placing of M. centronioides, M. megalantha, and M. axinaeoides in Sect. Adenodesma does not seem satisfactory. The five species above mentioned, along with M. notabilis Triana and M. poecilantha Uribe, form a related species-group, but the most satisfactory sectional disposition is not obvious at present.

MICONIA RAVENII Wurdack, sp. nov.

M. globuliferae Naud. affinis, sed laminis foliorum subtus pilis brevissime stipitato-stellatis instructis, inflorescentiae ramis sparsissime glanduloso-setulosis, floribus plerumque 4-meris differt.

Ramuli sulcato-quadrangulati sicut petioli inflorescentia hypanthiaque pilis barbellatis vel brevissime (stipite 0.2-0.3 mm longo, ramis 0.1 mm longis) stipitato-stellatis erectis dense induti. Petioli (2-)4-7 cm longi; lamina (7-)10-16 X (4-)6-10 cm ovata, apice gradatim hebeti-acuminato, basi rotundata vel paulo (ad 0.5 cm) cordata, membranacea et distanter (2-4 mm) undulato-serrulata, supra modice strigulosa, pilis simplicibus 0.4-1.2 mm longis, subtus sparsiuscule (5-6 per mm quad.) stipitato-stellata (stipite 0.1-0.15 mm longo, ramis 0.15-0.2 mm longis), 7-nervata, nervorum pare interiore 0.5-1 cm supra basim divergente nervis secundariis ca. 5 mm inter se distantibus, nervulis laxe areo-latis supra obscuris subtus crebre elevatis. Panicula submulti-

flora sparsissime glanduloso-setulosa, pedunculo 4-6 cm longo, ramis oppositis; flores plerumque 4-meri, pedicellis ca. 1.5 mm (in statu fructifero usque ad 3 mm) longis. Hypanthium (ad torum) 3.6 X 2.7 mm, pilis ca. 0.3-0.5 mm longis plerumque barbellatis pilis breviuscule stipitato-stellatis sparse intermixtis praeditum; calycis tubus 0.4 mm altus, lobis interioribus 0.5-0.7 mm altis oblatis, dentibus exterioribus setula terminali 0.3 mm longa inclusa ca. 0.6 mm eminentibus. Petala 5-5.4 X 4-4.2 mm oblongo-obovata, apice rotundato, minutissime granulosa. Filamenta 3 mm longa glabra; antherarum thecae 3.8 X 0.7 X 0.6 mm, poro 0.2 mm diam. paulo ventraliter inclinato. Stigma punctiforme; stylus 10 X 0.5-0.3 mm basim versus sparsissime glanduloso-setulosus; ovarium 4-loculare 9/10 inferum apice in collum 0.9 mm altum circum stylum protracto collo modice glanduloso-setuloso, pilis 0.1 mm longis.

✓Type Collection: D. E. Breedlove & P. H. Raven 12928 (holotype US 2469212; isotype DS), collected on a steep slope near ridge crest in the paraje of Banabil, Municipio Tenejapa, Chiapas, Mexico, elev. 2800 m, 10 Oct. 1965. "Plant 3 feet tall."

Miconia globulifera has the lower leaf surface hairs with a stalk about 0.25 mm long and the arms about 0.06 mm long, eglandular inflorescence pubescence, and predominantly 5-merous flowers. From the limited material examined (Seler 2938, det. Louis Williams), I am skeptical of the distinctness of M. echinoidea Standl. & Steyerm., described from Huehuetenango, Guatemala; indeed, M. globulifera has been collected on Cerro Boquerón in Chiapas no great distance from Huehuetenango. For the study of M. globulifera, Purpus 7333, from Cerro Boquerón, as well as two Vera Cruz collections (Schiede & Deppe 559, Pringle 8180) have been examined. Another relative in this complex is M. tuerckheimii Cogn., which has essentially sessile (the stalk to 0.1 mm long) stellate hairs on the hypanthia, much denser upper leaf surface pubescence (8-10 per sq. mm, rather than 4-5), and moderately glandular-setulose inflorescences. More distantly related are M. guatemalensis Cogn. and M. anisotricha (Schlecht.) Triana; the latter species (known by the recent collections Nelson 293, Pringle 8101, Pringle 13495, Rzedowski 15533, Conzatti 3474, and Balls 4710, from Vera Cruz, Hidalgo, and Oaxaca) is quite reminiscent of Leandra melanodesma (Naud.) Cogn. in general aspect, posing a generic problem. Of the examinable flowers in Breedlove 12928, 71 were 4-merous and 20 were 5-merous.

MICONIA JITOTOLANA Wurdack, sp. nov.

M. ravenii Wurdack affinis, sed foliis minoribus supra minus strigulosis, inflorescentia modice glanduloso-setulosa, floribus plerumque 5-meris, ovarii apice glabro differt.

Ramuli teretes sicut petioli inflorescentia hypanthiaque pilis stipitato-stellatis (stipite 0.2-0.6 mm longo, ramis 0.1-0.2 mm longis) erectis densissime armati. Petioli (1-)2-4 cm longi; lamina 5-11 X 2.5-5 cm ovato-elliptica, apice per 1-2 cm

gradatim hebeti-acuminato, basi late acuta, membranacea et integra, supra sparse strigulosa, pilis ca. 1 mm longis simplicibus 1(-2) per mm quad., subtus in superficie densiuscule puberula, pilis stipitato-stellatis stipite ca. 0.1 mm longo et ramis 0.2 mm longis, breviter 5-plinervata, nervorum pare interiore 0.5-1 cm supra basim subalternatim inserto, nervis secundariis 4-5 mm inter se distantibus, nervulis laxe reticulatis supra obscuris subtus ob pilos pro parte maxima occultis. Inflorescentia pauciflora sicut hypanthia sparsiuscule vel modice glanduloso-setulosa, pilis ca. 0.5 mm longis laevibus, pedunculo ca. 2.5 cm longo, ramis primariis plerumque tribus 1.5-2 cm longis; flores 5-meri ad ramorum apices glomerati, pedicellis crassis ca. 1.5 mm longis, bracteolis 1.5 X 0.2-0.3 mm caducis ad pedicellorum bases insertis. Hypanthium (ad torum) 3-3.5 X 3 mm; calycis tubus 0.8 mm altus, lobis interioribus 0.2 mm altis oblatis, dentibus exterioribus non eminentibus setula simplici 0.8-1 mm longa terminatis. Petala 4.4-4.5 X 3.5-4 mm glabra obovata apice oblique rotundata. Stamina isomorphica glabra; filamenta 3.5 mm longa; antherarum thecae 2.8-3 X 0.6-0.7 mm poro 0.15 mm diam. ventraliter inclinato. Stigma truncatum non expansum; stylus 8 X 0.5 mm glaber; ovarium 5-loculare 9/10 inferum glabrum, apice in collo 0.7 mm alto circum stylum protracto.

Type Collection: D. E. Breedlove 11951 (holotype US 2469210; isotype DS), collected on slope along road to Pueblo Nuevo Solistahuacán, 8 km south of Jitotol, Chiapas, Mexico, elev. 1700 m, 19 August 1965. "Flowers white; plant 5 feet tall."

Of the flowers examined in Breedlove 11951, 43 showed 5-mery and 3 were 4-merous. As is obvious in the discussion under M. ravenii, the Guatemalan species M. echinoidea Standl. & Steyerm. and M. tixixensis Standl. & Steyerm. certainly do not lack Central American relatives; indeed, the plethora of cognates indicates the need for species reevaluation here and also elsewhere in Miconia Sect. Octomeris.

MICONIA SNEIDERNII Wurdack, sp. nov.

M. multuplinerviae Cogn., M. penicillatae Gleas., et M. fosbergii Wurdack affinis, sed foliis non plinervatis supra densiuscule pilis stipitato-stellatis ornatis differt.

Ramuli teretes sicut petioli foliorum subtus venae primariae inflorescentiaque pilis erectis stipitato-stellatis (stipite 1-1.8 mm longo, ramis 0.5 mm longis) dense induti. Petioli 1-1.4 cm longi; lamina 7-10 X 3-5.5 cm elliptico-ovata, apice acuto vel paulo gradatimque acuminato, basi rotundata vel paulo (0.2 cm) cordata, firme membranacea et integra, supra et subtus sicut hypanthia pilis stellatis breviter (0.3-0.5 mm) stipitatis modice vel dense induta, 5-nervata nervis secundariis 3-4 mm inter se distantibus sicut nervis tertiariis supra paulo impressis subtus paulo elevatis nervulis reticulatis areolis 0.3-0.5 mm latis. Panicula 16 X 10 cm multiflora, ramis ramulisque pilis laevibus glanduliferis 0.8-1.3 mm longis sparse obsitis; flores 5-meri in

glomerulis ad ramulorum apices aggregati, bracteolis ca. 1.5 X 0.4 mm basalibus, pedicellis 0.7 mm longis. Hypanthium (ad torum) 1.5 mm longum; calycis tubus 0.2 mm altus, lobis interioribus 0.4-0.6 mm longis oblongis, dentibus exterioribus lobos interiores aequantibus dense pilis stipitato-stellatis obsitis. Petala densiuscule granulosa 2-2.3 X 1.7-2 mm obovata, apice retuso. Filamenta 2.1-2.3 mm longa glabra; antherarum thecae 0.7-0.9 mm spathulatae introrse biporosae, apice 0.2-0.3 mm emarginato, connectivo 0.8 mm prolongato ad basim ventraliter paulo bicornuto dorsaliter dente hebeti descendente 0.1-0.2 mm longo ornato. Stigma capitellatum 0.6 mm diam.; stylus 3.8-4 X 0.3-0.4 mm glaber in ovarii apicem immersus; ovarium 3-loculare 1/3 inferum apice setulis ca. 8 glanduliferis 0.4-0.5 mm longis coronato.

Type Collection: Kjell von Sneidern 5525 (holotype S), collected at Pueblo Rico, La Selva, Depto. Caldas, Colombia, elev. 1500 m, 28 December 1945. "Flowers white."

The suggested relatives have plinerved leaves which, on the upper surface, are either glabrous or with simple basally expanded hairs. My previous remarks about the inconclusive nature of the anther form for sectional delimitation (Phytologia 11: 390-391. 1965) are still pertinent. Apart from the anthers, the general aspect of M. sneidernii is like that of M. barbinervis (Benth.) Triana and its allies (including M. stipitata Gleason and M. cionotricha Uribe ex char.)

MICONIA SALTUENSIS Wurdack, sp. nov.

Sect. Amblyarrhena. M. bangii Cogn. et M. amabili Cogn. affinis, sed petiolis linea paulo elevata in nodis connectis differt.

Frutex 0.8-4 m. altus. Ramuli obtuse sulcato-quadrangulati demum teretes sicut folia inflorescentiaque primum appresso-squamulosi mox glaberrimi. Petioli 0.7-1.2 cm longi; lamina 7-14 X 3-5 cm oblongo-elliptica, apice brevissime hebetissimeque acuminato, basi acuta (in petiolem ca. 0.5 cm decurrens), rigidiuscula et integra, 5-plinervata nervorum pare interiore 0.4-1.5 cm supra basim inserto pare exteriore paulo debili nervis secundariis 1.5-3 mm inter se distantibus subtus subplanis sed obviis nervulis reticulatis areolis plerumque 0.7-0.9 mm diam. Inflorescentia submultiflora 7-10 X 4-6 cm, ramulis teretibus vel paulo quadratis; flores 5-meri, pedicellis 1-2 X 0.7 mm, bracteolis 2.5 X 0.6 mm mox caducis juxta hypanthii basim vel paulo infra insertis. Hypanthium (ad torum) 3.3 X 3.5 mm; calycis tubus 0.3 mm altus, lobis interioribus 0.3-0.4 X 2.2 mm oblatis, apice rotundato, dentibus exterioribus tuberculiformibus lobos interiores aequantibus. Petala 4-4.5 X 3.5-4 mm suborbicularia dense granulosa. Stamina isomorphica; filamenta 4 mm longa ventraliter apicem versus sparsissime puberula, pilis non glandulosis 0.2 mm longis; antherarum thecae 2.8-2.9 X 1.3 X 1 mm oblongae exappendiculatae, poro 0.3 mm diam. dorsaliter inclinato. Stigma 1.5 mm diam. capitellatum; stylus 5 X 0.7-1.2 mm pilis gracilibus non glandulosis 0.2 mm longis densiuscule

indutus in ovarii apicem 0.5 mm immersus; ovarium 3-loculare 1/2 inferum, apice conico sparse puberulo.

Type Collection: P. C. Hutchison, J. K. Wright, & R. M. Straw 5935 (holotype US 2469205; isotypes UC, USM), collected at Carpish, above Acomayo on the road to Tingo Maria, Depto. Huánuco, Peru, elev. 2800 m, 17 July 1964. "Leaves red-margined, shiny green, lighter beneath. Flowers creamy white; receptacle green; anthers and filaments golden, the anthers later orange-brown."

Paratypes (both topotypical): R. Ferreyra 8066, 1 Oct. 1950; E. Asplund 13090, 15 Sept. 1940.

Both M. bangii and M. amabilis have similar puberulous styles but smaller petals; both lack the elevated interpetiolar line at the branchlet nodes. Miconia lucida Naud. (ex descr. and type photograph) has interpetiolar lines but a narrow hypanthium and truncate calyx limb as well as a non-expanded stigma. More distant relatives of M. saltuensis, all with much smaller flowers and glabrous styles, include M. terera Naud., M. cookii Gleason, and M. pulgari Macbride. The description of M. adrienii Macbride might be somewhat suggestive of M. saltuensis; however, that species has corymbiform inflorescences, longer calyx lobes, glabrous styles, and, particularly, pleiostemony - a feature not noted in the original description. Recent collections of M. adrienii (which have been compared with the holotype) are: Ferreyra 990 (US), La Divisoria, San Martín; Asplund 12567 (S), from Divisoria, Huánuco; and Asplund 13294 (S), from between Pumahuasi and Divisoria.

MICONIA HUTCHISONII Wurdack, sp. nov.

Sect. Amblyarrhena. M. alypifoliae Naud. affinis, sed foliis subtus in nervorum primariorum axillis setulosis, stigmatibus capitellatis differt.

Ramuli quadrangulati demum teretes sicut folia (poculis subtus exceptis) inflorescentia floresque glabri et paulo vernicosi. Petioli 0.2-0.4 cm longi; lamina i. s. luteola 0.8-1.3 X 0.5-0.8 cm, elliptica vel ovato-elliptica apice hebeti-acuto basi late acuta vel obtusa, coriacea et integra vel apicem versus inconspicue 1-2-dentata, subtus sparse resinoso-glandulosa et in venarum primariarum axillis paucisetulosa setulis 0.2-0.4 mm longis, trinervata nervis secundariis paucis 1-1.5 mm inter se distantibus supra invisis subtus obscure evolutis venulis invisis. Paniculae numerosae submultiflorae, ramis adscendentibus; flores (4-)5-meri, pedicellis 1.5-2.5 mm longis, bracteolis mox caducis non visis. Hypanthium (ad torum) 3 X 1.8 mm; calycis tubus 0.3 mm altus, lobis 0.4 mm altis late triangularibus late acutis, dentibus exterioribus omnino adnatis tuberculatis lobos interiores aequantibus. Petala glabra 2-2.2 X 2.4-2.5 mm suborbicularia, apice rotundato vel paulo emarginato. Stamina glabra subanisomorphica; filamenta 1 mm longa; antherarum thecae 1.1 X 0.5-0.7 mm oblongae, apice emarginate poroso poro 0.3 mm diam., connectivo crasso basaliter 0.3 mm prolongato. Stigma capitellatum 0.8 mm diam.; stylus glaber 3.3 X 0.3-0.6 mm; ovarium omnino

inferum 3-loculare, apice glabro.

Type Collection: P. C. Hutchison & J. K. Wright 6638 (holotype US 2469206; isotypes UC, USM), collected on the summit 25 km above Huancabamba, on the road to Canchaque, Prov. Huancabamba, Depto. Piura, Peru, elev. 3200 m, 17 Sept. 1964. "Shrub 0.5-1 m."

Miconia alypifolia, known from southern Ecuador and northern Peru (Cajamarca), has glabrous primary vein axils on the lower leaf surfaces and truncate non-expanded stigmas, as well as larger (2.2-2.5 mm long) anthers with the connectives inconspicuously prolonged basally. Two other species of Miconia, both of Sect. Cremanium, reported from northern Peru have the general aspect (glabrous, small-leaved) of M. hutchisonii; M. vaccinioides (Bonpl.) Naud. has nodding 4-merous flowers and quite different large-pored anthers, while M. buxifolia Naud. has large-pored anthers and esetulose leaf vein axils. Oddly, M. vaccinioides apparently has not been collected since Weberbauer's field days. I have not seen any Peruvian collection of M. buxifolia (Weberbauer 4163, from Huambos, Cajamarca, was so cited in the Flora of Peru) and am somewhat skeptical of this record. Of the countable flowers in Hutchison & Wright 6638, 42 were 5-merous and 30 were 4-merous.

MICONIA MEDIA (D. Don) Naud. subsp. CAJAMARCENSIS Wurdack, subsp. nov.

A subsp. media foliis novellis subtus ubique laxe setulosis, pilis laxis luteis 1-1.6 mm longis, in superficie tarde glabratis differt.

Type Collection: P. C. Hutchison & J. K. Wright 5028 (holotype US 2469204; isotypes UC, USM), collected on a steep brushy hillside 1 km northeast of San Pablo, Depto. Cajamarca, Peru, elev. 2630 m, 13 May 1964.

The typical subspecies has the laminar pubescence confined to the primary vein axils and primary vein bases on the lower surface (as does subsp. borealis Wurdack). In subsp. cajamarcensis, the external pair of primary leaf veins are more obvious than in the typical subspecies and the young branchlets and inflorescences are more densely (but caducously) stellulate-furfuraceous. There are no floral differences apparent in the Peruvian populations; an Ecuadorian subspecies (the description now in press for the Memoirs of The New York Botanical Garden) has glandular-puberulous styles.

ADDITIONAL NOTES ON THE GENUS VERBENA. III

Harold N. Moldenke

VERBENA [Dorst.] L.

Additional synonymy: Verbena [Tourn.] L. ex Migula, Exkursionsfl. Deutsch. 2: 134. 1906. Verbenia L. ex Moldenke, Alph. List Invalid Names Suppl. 1: 28, in syn. 1947; Runner, Rep. G. W. Groff Coll. 361. 1961.

Additional & emended bibliography: Rumph., Herb. Amboin. 7: 60, pl. 27, fig. 2. 1755; Röhl., Deutschl. Fl., ed. 1, 2: 329 & 553. 1812; Mössler, Gemein. Handb. Gew. 2: 816 & Reg. 1815; W. D. J. Koch in Röhl., Deutschl. Fl., ed. 2, 4: 211, 339, & 744. 1833; W. D. J. Koch, Syn. Fl. Germ., ed. 1, 578 & 844. 1837; Guill., Enum. Pl. Déc. Voy. Iles Société 42 & 209. 1837; W. D. J. Koch, Syn. Deutsch. & Schw. Fl., ed. 1, 575--576 & Reg. 99. 1838; Meigen, Deutschl. Fl. 3: 130 & 620. 1842; W. D. J. Koch, Taschenb. Deutsch. Fl., ed. 1, 417 & 604. 1843; W. D. J. Koch, Syn. Fl. Germ., ed. 2, 2: 664 & 964 (1844) and ed. 2, 3: 1160. 1845; W. D. J. Koch, Syn. Deutsch. & Schw. Fl., ed. 2, 681--682 & 1206. 1846; G. & F. Lorinser, Taschenb. Fl. Deutsch., ed. 1, 311 & 488 (1847) and ed. 2, 311 & 488. 1851; W. D. J. Koch, Taschenb. Deutsch. Fl., ed. 3, 417 & 604 (1851) and ed. 4, xliii, 400, & 583. 1856; Langmann, Fl. Nord- & Mitteldeutsch., ed. 2, 110, 252--253, & 462. 1856; Guillard, Bull. Soc. Bot. France 4: 122. 1857; W. D. J. Koch, Taschenb. Deutsch. Fl., ed. 5, xliii, 400, & 583. 1860; Bocq., Adansonia 2: 86, 106--107, 110--113, 115, 118, 123, 124, 126--128, 130--133, 136, 139, 140, 142, 144, 146, 147, 149, 152--154, 157, & 158 (1862) and 3: 178, 180, 181, 183, 185, & 201--204. 1863; Bocq., Rev. Verbenac. 86, 106--107, 110--113, 115, 118, 123, 124, 126--128, 130--133, 136, 139, 140, 142, 144, 146, 147, 149, 152--154, 157, 158, 178, 180, 181, 183, 185, & 201--204. 1863; W. D. J. Koch, Taschenb. Deutsch. Fl., ed. 6, xliii, 400, & 583. 1865; Langethal, Beschreib. Gew. Deutsch., ed. 2, 448 & 786. 1868; Miq., Cat. Mus. Bot. Lugd.-Bat. 70. 1870; E. Hall. in W. D. J. Koch, Taschenb. Deutsch. Fl., ed. 7, 403 & 802 (1878) and ed. 8, 403 & 802. 1881; Lefroy, Bull. U. S. Nat. Mus. 25: 96. 1884; K. G. Luts, Pflanzenfr. 93 & 128, pl. 17, fig. 19. 1887; W. Medic., Illustr. Pflanzenb. viii, xxxix, & 115, pl. 50, fig. 112 & 112a. 1893; C. E. Bessey, Essent. Bot., ed. 7, 287, 334, & 355. 1896; J. Matsum., Bot. Mag. Tokyo 13: [113]--114. 1899; Ichimura, Bot. Mag. Tokyo 13: 116. 1899; Migula, Exkursionsfl. Deutsch. 2: 134 & 185. 1906; Hall. & Brand in W. D. J. Koch, Syn. Deutsch. Fl., ed. 3, 3: 2156 & 3088. 1907; Kawakami, List Pl. Formos. 85. 1910; W. Stone, Ann. Rep. N. J. State Mus. 1910: 660--661 & 827. 1911; A. Stewart, Proc. Calif. Acad. Sci., ser. 4, 1: 134. 1911; Dunn & Tutcher, Kew Bull. Misc. Inf. Addit. Ser. 10: 201 & 202. 1912; E. D. Merr., Interpret. Rumph. Herb. Amboin. 547. 1917; C. Robertson, Psyche 29: 159--173. 1922; Gamble, Fl. Madras 1085 & 1106. 1924; S. Sasaki, List Pl.

Formos. 353. 1928; H. W. Harvey, Ga. State Coll. Agr. Ext. Div. Bull. 402, ed. 1, 34 & [43]. 1931; Hand.-Mazz., Ann. Hort. Gothenb. 9: [67]. 1934; Sampaio, Bol. Mus. Nac. Rio Jan. 13: 190, 191, 234, 240, & 292. 1937; R. W. R. Mill., Gard. Book Barbados 74 & x. 1935; Fletcher, Kew Bull. Misc. Inf. 1938: 408 & 410--411. 1938; Hottes, Book Shrubs, ed. 4, 404. 1942; Blakelock, Kew Bull. Misc. Inf. 1949: 539. 1949; Brenan, Kew Bull. Misc. Inf. 1950: 224 & 226. 1950; Chittenden, Roy. Hort. Soc. Dict. Gard. 3: 1188 & 1189 (1951) and 4: 1898. 1951; Bodger, Electros Fls. 27, 61, 95, & 105, pl. 54g, 44le, 573c, 956a, 1137f, & 3018f. 1952; K. H. Rechinger, Arkiv Bot., ser. 2, 2: 408. 1952; H. C. Greene, Trans. Wisc. Acad. Sci. 42: 70. 1953; Bor & Raizada, Some Beaut. Ind. Climbers [136]. 1954; Berhaut, Fl. Sénegal 65. 1954; Darlington & Wylie, Chromosome Atl., pr. 1, 322--323 & 518. 1955; E. W. Lathrop, Univ. Kans. Sci. Bull. 39: 124, 125, 137, 172, & 173. 1958; Mostert, Bot. Surv. S. Afr. Mem. 31: 41 & 191. 1958; T. A. Rao, Bull. Bot. Surv. Ind. 1: 114. 1959; K. H. Rechinger, Arkiv Bot., ser. 2, 5: 346. 1959; J. Hutchinson, Fam. Flow. Pl., ed. 2, 2: 395. 1959; Anon., Kew Bull. Gen. Index 1929-1956, 291. 1959; E. H. Moss, Fl. Alberta 397. 1959; Nath, Bot. Surv. South. Shan States 143. 1960; Gupta & Marlange, Trav. Sect. Scient. Inst. Franç. Pond. 3 (1): 4 & 11. 1961; Thommen, Atl. Poche Fl. Suisse 2198. 1961; Runner, Rep. G. W. Groff Coll. 361. 1961; Darlington & Wylie, Chromosome Atl., pr. 2, 322--323 & 518. 1961; Nair & Rehman, Bull. Nat. Bot. Gard. Lucknow 76: 3--4 & 8. 1962; Clapham, Tutin, & Warburg, Fl. Brit. Isles, ed. 2, 729--730. 1962; Lid, Norsk & Svensk. Fl. 568 & 569, fig. 341a. 1963; Quezel & Santa, Nouv. Fl. Algérie 2: 779 & 780. 1963; Huber, Heppel, & Meikle in Hutchinson & Dalz., Fl. W. Trop. Afr., ed. 2, 2: 432. 1963; Hepper in Hutchinson & Dalz., Fl. W. Trop. Afr., ed. 2, 2: 434. 1963; Meikle in Hutchinson & Dalz., Fl. W. Trop. Afr., ed. 2, 2: 437. 1963; Balakrishnan, Bull. Bot. Surv. Ind. 6: 81--92. 1964; H. C. Greene, Trans. Wisc. Acad. Sci. 53: 194--195. 1964; Ungar, Univ. Kans. Sci. Bull. 46: 18, 19, & 28. 1965; Percival, Flor. Biol. 131--132. 1965; Backer & Bakh., Fl. Java 2: 595 & 596. 1965; J. E. Weaver, Native Veg. Nebr. 25. 1965; A. D. Hawkes, Guide Fl. Everglades Nat. Park 43 & [51]. 1965; Liogier, Rhodora 67: 349. 1965; Solbrig, Castanea 30: 173--174. 1966; Rickett, Wild Fls. U. S. 1 (2): 361--364, pl. 112 & 113. 1966; C. B. Clarkson, Castanea 31: 100. 1966; Balakrishnan, Biol. Abstr. 47: 4615. 1966; T. Swain, Compar. Phytochem. 348. 1966; Bate-Smith & Swain in T. Swain, Compar. Phytochem. 166 & 170. 1966; Harborne in T. Swain, Compar. Phytochem. 285. 1966; Moldenke, Phytologia 13: 243--276, 307, 366, 401, 509, & 512 (1966) and 14: 175. 1966; G. Taylor, Ind. Kew. Suppl. 13: 143. 1966; Anon., Gen. Costa Ric. Phan. 10. 1966; Moldenke, Résumé Suppl. 14: 1--3, 5, 9, & 10. 1966; Anon., Assoc. Etud. Tax. Fl. Afr. Trop. Index 1965: 67. 1966; Kitamura, Results Kyoto Univ. Scient. Exped. Karakoram 8: 132. 1966; J. Gómez, Biota 6: 103, 107, 109, 114--116, & 119. 1966; R. C. Jacks., Reg. Veget. 43: 59. 1966; Stearn, Botan. Latin 295. 1966; Anon., Biol. Anstr. 47 (20): S.67 & S.162. 1966; Herbst Bros., Seeds for Nurserymen 23. 1966; G. B. Foster, Herbs for Every Gard. 199. 1966; Ross-Craig, Drawings Brit. Fl. 23: pl. 38. 1966.

Robertson (1922) and Percival (1965) report that Verbenajus verbenae is an oligolectis bee of the family Panurgidae which collects solely from three species of Verbena, viz., V. hastata L., V. stricta Vent., and V. urticifolia L. Mostert (1958) reports that an unidentified prostrate herbaceous Verbena species was recorded from Bloemfontein, South Africa, represented by G. Potts 2079. Weaver (1965) mentions but does not identify a "woods vervain" found in Nebraska only in woodlands, not on the prairies.

The Heddle 2816, distributed as a species of Verbena, is actually Lantana macropoda Torr., while M. C. Johnston 2664, Waterfall & Wallis 13476, and Weintraub & Roller 173 are Priva grandiflora (Ort.) Moldenke, and Bowman s.n. [Sept. 29, 1957] is Salvia occidentalis Sw. in the Lamiaceae.

VERBENA ALATA Sweet

Additional bibliography: Bocq., Adansonia 3: [Rev. Verbenac.] 202. 1863; Moldenke, Phytologia 13: 181. 1966.

VERBENA AMBROSIFOLIA Rydb.

Additional bibliography: Darlington & Wylie, Chromosome Atl., pr. 1, 323 (1955) and pr. 2, 323. 1961; Moldenke, Phytologia 13: 244. 1966.

Additional citations: TEXAS: Brewster Co.: D. S. Correll 33820 (Ld).

VERBENA BERTERII (Meisn.) Schau.

Additional bibliography: Bocq., Adansonia 2: 126 (1862) and 3: 202. 1863; Bocq., Rev. Verbenac. 126 & 202. 1863; Moldenke, Phytologia 13: 183. 1966.

VERBENA BIPINNATIFIDA Nutt.

Emended synonymy: Verbena bipinnatifida Schau. apud Bocq., Adansonia 3: 202. 1863.

Additional bibliography: Bocq., Adansonia 3: [Rev. Verbenac.] 202. 1863; Moldenke, Phytologia 13: 244--246. 1966; Rickett, Wild Fls. U. S. 1 (2): 364. 1966.

Jones found this species growing in post oak savannas.

Additional citations: TEXAS: Bexar Co.: Martz & Martz s.n. [June 3, 1959] (Ws). Brown Co.: Benson & McCart 9334 (Ld); Ewing 27 (Ld). Burnet Co.: J. Jones 1 (Ld); F. Sylvester 2 (Ld). Coleman Co.: J. Folkner 13 (Ld); H. Spoon 13 (Ld). Coryell Co.: S. Jackson 11 (Ld). Eastland Co.: Wheeless 18 (Ld). Foard Co.: C. Turner 17 (Ld). Garza Co.: B. Jensen 8 (Ld). Kaufman Co.: C. Duke 10 (Ld). San Saba Co.: Calhoun 13 (Ld); E. Howell 1 (Ld). Williamson Co.: J. Sargent 6 (Ld).

xVERBENA BLANCHARDI Moldenke

Additional bibliography: E. W. Lathrop, Univ. Kans. Sci. Bull.

39: 172. 1958; Moldenke, Phytologia 13: 184. 1966.

VERBENA BONARIENSIS L.

Additional bibliography: Guill., Enum. Pl. Déc. Voy. Iles Société 209. 1837; Bocq., Adansonia 3: [Rev. Verbenac.] 202. 1863; Dunn & Tutcher, Kew Bull. Misc. Inf. Addit. Ser. 10: 201. 1912; Gamble, Fl. Madras 1106. 1924; Sampaio, Bol. Mus. Nac. Rio Jan. 13: 191. 1937; Darlington & Wylie, Chromosome Atl., pr. 1, 323. 1955; Mostert, Bot. Surv. S. Afr. Mem. 31: 41 & 191. 1958; Darlington & Wylie, Chromosome Atl., pr. 2, 323. 1961; Backer & Bakh., Fl. Java 2: 596. 1965; Liogier, Rhodora 67: 349. 1965; Moldenke, Phytologia 13: 245. 1966.

Recent collectors describe this plant as having the calyx green below to reddish above, the corolla whitish below, reddish in the central region, and lavender above, with white hairs, the anthers yellow-green, and the pistil green, flowering in June, and growing at 2500 to 4500 feet altitude in Jamaica. Backer & Bakhuizen van den Brink (1965) report that in Java it grows in agricultural fields, Cinchona plantations, grassfields, and along roadsides. Mostert (1958) states that in South Africa it is found on streambanks, dams, pans, flooded and irrigated areas subject to wetness and drought, severe grazing, and trampling, while Sidey refers to it there as a "shrub 5--6 feet tall", with purple flowers. Sampaio (1937) records the vernacular name "cambará de capoera".

Additional citations: JAMAICA: Crosby, Hespenheide, & Anderson 231 (Mi); Yuncker 18674 (Mi). SOUTH AFRICA: Cape of Good Hope: Sidey 3772 (S).

VERBENA BRACTEATA Lag. & Rodr.

Additional bibliography: Bocq., Adansonia 3: [Rev. Verbenac.] 202. 1863; E. W. Lathrop, Univ. Kans. Sci. Bull. 39: 173. 1958; E. H. Moss, Fl. Alberta 397. 1959; Ungar, Univ. Kans. Sci. Bull. 46: 28. 1965; Rickett, Wild Fls. U. S. 1 (2): 362, pl. 112. 1966; R. B. Clarkson, Castanea 31: 100. 1966; Moldenke, Phytologia 13: 245. 1966.

Additional illustrations: Rickett, Wild Fls. U. S. 1 (2): pl. 112 [in color]. 1966.

Holmgren & Reveal 1023 is said to have had "blue-violet" corollas and was "infrequent" in wet gravelly soil along the levee of a ditch at 6300 feet altitude in Nevada, flowering in June. Moss (1959) calls this plant "carpet vervain" and describes it as having branches more or less hirsute and blue to purple corollas, growing on "stream flats, roadsides and waste places in the prairie region" of Alberta. Lathrop (1958) describes the habitat of the species as "fields, waste places, and pastures", while Ungar (1965) tells us that it is "prominent" on grazed sandhills in the therophyte formation.

Additional citations: NEVADA: White Pine Co.: Holmgren & Reveal 1023 (Mi). NEBRASKA: Buffalo Co.: Guthe s.n. [Kearney, June 1893] (Mi). TEXAS: Floyd Co.: Purvis 21 (Ld).

VERBENA BRASILIENSIS Vell.

Additional synonymy: Verbena brasiliensis L., in herb.

Additional bibliography: Sampaio, Bol. Mus. Nac. Rio Jan. 13: 240. 1937; Moldenke, Phytologia 13: 245. 1966; Rickett, Wild Fls. U. S. 1 (2): 364. 1966.

Recent collectors describe this plant as 2—3 feet tall, with a minty odor, growing at low as 200 meters altitude in Peru. Eiten found it in São Paulo growing in waste ground in the shade of a large leguminous tree, in poor soil — reddish-brown fine sand with a little clay — in what was originally cerrado vegetation; Ugent found it on sunny lichen-covered rock piles among Inca ruins in Cuzco; while Iltis and his associates found it among weeds along roadsides and in highway center-strips, in cultivated potato fields, and among weeds in fertile deep-soil cabbage (Brassica oleracea) fields along with abundant Solanum calcense and also Rumex, Eragrostis, Oxalis, Polygonum, Galinsoga, Tagetes, etc. The flowers on G. Eiten 1595 are described as having been "light-purple".

Additional citations: PERU: Cuzco: Iltis, Iltis, Ugent, & Ugent 891 (Ws); D. Ugent 5354 (Rf). Junín: Iltis, Iltis, Ugent, & Ugent 347 (Ac). Lima: Iltis, Iltis, Ugent, & Ugent 390 (Rf). BRAZIL: São Paulo: G. Eiten 1595 (N).

VERBENA CAMERONENSIS L. I. Davis

Additional bibliography: Moldenke, Phytologia 13: 245 & 257. 1966.

VERBENA CANADENSIS (L.) Britton

Additional bibliography: Bocq., Adansonia 2: 126 (1862) and 3: 202. 1863; Bocq., Rev. Verbenac. 126 & 202. 1863; Darlington & Wylie, Chromosome Atl., pr. 1, 323. 1955; E. W. Lathrop, Univ. Kans. Sci. Bull. 39: 125 & 173. 1958; Darlington & Wylie, Chromosome Atl., pr. 2, 323. 1961; Moldenke, Phytologia 13: 245—246. 1966; Rickett, Wild Fls. U. S. 1 (2): 362 & 364, pl. 112. 1966.

Additional illustrations: Rickett, Wild Fls. U. S. 1 (2): pl. 112 [in color]. 1966.

Lathrop (1958) tells us that this plant is frequent and prominent on prairies in the spring, in rocky prairie pastures and prairie woodlands, in open woods, and along roadsides.

Additional citations: TEXAS: Henderson Co.: Correll & Correll 33960 (Ld). County undetermined: T. Drummond 263 (S).

VERBENA CANESCENS H.B.K.

Additional bibliography: Bocq., Adansonia 3: [Rev. Verbenac.] 202. 1863; Moldenke, Phytologia 13: 246. 1966.

Recent collectors have found this plant growing on dry grazed slopes with Agave, Opuntia, Acacia, and Solanum polyadenium and on grazed roadsides and in drainage ditches with Yucca, Bouvardia, and cacti, in mesquite grasslands now becoming desert. The flowers are described as "blue" on Roe, Roe, & Mori 4.

Additional citations: MEXICO: Coahuila: Roe, Roe, & Mori 4 (Ws). Puebla: Ugent & Flores C. 2539 (Ws).

VERBENA CANESCENS var. ROEMERIANA (Scheele) Perry

Additional bibliography: Moldenke, Phytologia 13: 246. 1966.

Runyon describes this plant as a low annual herb with many branches above the base, frequent on open clay soil, and with blue flowers.

Additional citations: TEXAS: Brown Co.: Benson & McCart 9335 (Ld). Cameron Co.: R. Runyon 6067 (Ld). Coleman Co.: B. E. Holland 21 (Ld). Travis Co.: Webster & Webster 115 (Mi).

VERBENA CAROLINA L.

Additional bibliography: Bocq., Adansonia 3: [Rev. Verbenac.] 203. 1863; A. Stewart, Proc. Calif. Acad. Sci., ser. 4, 1: 134. 1911; Moldenke, Phytologia 13: 246, 251, & 258. 1966; Moldenke, Résumé Suppl. 14: 2. 1966.

Breedlove found this species growing on grassy slopes, grassy road banks, and in large moist pastures. He describes the flowers as "blue" on his nos. 10457 & 11452 and as "pale-blue" on no. 10519. Feddema 1659 is said to have had the "corolla white with lavender ring in throat", and is said to have been "an occasional weed at field margins" in weedy fallow cornfields.

Other recent collectors have found the plant growing in grazed fire-scarred pine woods, growing through a thick layer of pine needles mulch, along very moist grazed roadsides, and in brush piles, as well as in open spots in dense Pinus and Quercus woods along with Solanum skutchii and S. stenophyllidium. The flowers of Roe, Roe, & Mori 1530 are said to have been "lavender".

The R. I. Bowman 81, distributed as V. carolina, is actually V. sedula Moldenke.

Additional citations: MEXICO: Chiapas: Breedlove 10457 (Ac), 10519 (Rf). Guerrero: Feddema 1659 (Mi). México: Roe, Roe, & Mori 1530 (Rf). Michoacán: Ugent & Flores C. 2217 (Ws), 2245 (Ws). GUATEMALA: Quezaltenango: Breedlove 11452 (Rf).

VERBENA CILIATA Benth.

Additional bibliography: Moldenke, Phytologia 13: 246, 257, & 273. 1966; Moldenke, Résumé Suppl. 14: 1 & 10. 1966.

Feddema describes this plant as an "occasional weed of cornfields" in Jalisco. His no. 2335 is said to have had "blue-lavender" flowers. The flowers on Mick & Roe 15 are said to have been "violet" in color, but those on Roe, Roe, & Mori 10, 23, & 40 were "lavender".

Recent collectors have found this plant growing along grazed roadsides and drainage ditches with Yucca, Bouvardia, and cacti in mesquite grasslands now becoming desert, on heavily grazed roadsides with species of Yucca, Acacia, and cacti in highly disturbed mesquite grassland vegetation with cornfields, and on dry grazed

slopes with Agave, Opuntia, Acacia, and Solanum polyadenium. Mick & Roe call the species "common" in deserts with "extensive desert pavement", along with Agave, Aloë, and cacti.

Additional citations: MEXICO: Coahuila: Mick & Roe 15 (Rf); Roe, Roe, & Mori 10 (Ws), 23 (Ac). Jalisco: Feddema 2335 (Mi). Nuevo León: Roe, Roe, & Mori 40 (Ws). Puebla: Ugent & Flores C. 2522 (Ws).

VERBENA CILIATA var. LONGIDENTATA Perry

Additional bibliography: Moldenke, Phytologia 13: 246 & 247. 1966; Moldenke, Résumé Suppl. 14: 10. 1966.

VERBENA CILIATA var. PUBERA (Greene) Perry

Additional bibliography: Moldenke, Phytologia 13: 246, 247, & 257. 1966; Moldenke, Résumé Suppl. 14: 1. 1966.

VERBENA CLAVATA Ruíz & Pav.

Additional bibliography: Bocq., Adansonia 2: 126. 1862; Bocq., Rev. Verbenac. 126. 1863; Moldenke, Phytologia 13: 190. 1966.

VERBENA COCHABAMBENSIS Moldenke

Additional bibliography: Moldenke, Phytologia 10: 103. 1964.

Recent collectors have found this plant growing on dry rocky bluffs above roadsides, flowering and fruiting in May.

Additional citations: BOLIVIA: Cochabamba: Ugent & Ugent 5223 (Ac, Rf).

VERBENA CORYMBOSA Ruíz & Pav.

Additional bibliography: Bocq., Adansonia 3: [Rev. Verbenac.] 202. 1863; Darlington & Wylie, Chromosome Atl., pr. 1, 323 (1955) and pr. 2, 323. 1961; Moldenke, Phytologia 13: 247. 1966.

VERBENA CRITHMIFOLIA Gill. & Hook.

Additional bibliography: Darlington & Wylie, Chromosome Atl., pr. 1, 323 (1955) and pr. 2, 323. 1961; Moldenke, Phytologia 11: 454. 1965.

VERBENA CUNEIFOLIA Ruíz & Pav.

Additional bibliography: Bocq., Adansonia 3: [Rev. Verbenac.] 203. 1863; Moldenke, Phytologia 13: 191. 1966; J. Gómez, Biota 6: 107, 109, 115, & 119. 1966.

Gómez (1966) records for this species the vernacular name "paraíso", a name also applied to V. fasciculata Benth.

VERBENA DELTICOLA Small

Additional bibliography: Moldenke, Phytologia 13: 247 & 274. 1966.

VERBENA DISSECTA Willd.

Additional bibliography: Bocq., Adansonia 3: [Rev. Verbenac.] 203. 1863; Darlington & Wylie, Chromosome Atl., pr. 1, 322 (1955)

and pr. 2, 322. 1961; Moldenke, Phytologia 13: 247—248, 251, 255, 256, 262, 263, 268, 270, & 271. 1966.

Bocquillon (1863) refers to this taxon as "V. dissecta Walp.", a binomial referred by me to V. sulphurea D. Don.

Recent collectors have found V. dissecta growing on weedy, previously cultivated, but now fallow slopes along with Solanum boliviense, S. radicans, Chenopodium, Tagetes, Setaria, and Plantago.

Additional citations: BOLIVIA: Chuquisaca: Ugent & Cárdenas 4988 (Ac, Rf).

VERBENA DISSECTA f. ALBA Moldenke

Additional bibliography: Moldenke, Phytologia 13: 248 & 255. 1966.

VERBENA ELEGANS H.B.K.

Additional bibliography: Moldenke, Phytologia 13: 248. 1966; Moldenke, Résumé Suppl. 14: 2. 1966.

Recent collectors have encountered this plant on steep slopes with Quercus and on east-facing limestone cliffs with Acacia and Agave in Quercus scrub vegetation on rolling hills in the mesquite-grassland zone. The flowers are described as "purple" on Breedlove 12421 and as "maroon-red" on Roe, Roe, & Mori 123.

Additional citations: MEXICO: Chiapas: Breedlove 12421 (Ac). San Luis Potosí: Roe, Roe, & Mori 123 (Ac).

xVERBENA ENGELMANNII Moldenke

Additional bibliography: Moldenke, Phytologia 13: 248. 1966; Moldenke, Résumé Suppl. 14: 1. 1966.

One of the A. R. Moldenke 821 specimens previously cited as deposited in my personal herbarium is now in that of the Texas Research Foundation at Renner, Texas.

Additional citations: NEW YORK: County undetermined: J. Torrey s.n. (Mi). ILLINOIS: Marion Co.: A. R. Moldenke 1261 (Rf). MISSOURI: Ralls Co.: A. R. Moldenke 1278 (Ac). Randolph Co.: A. R. Moldenke 1281 (Rf). MOUNTED ILLUSTRATIONS: A. R. Moldenke Kod. 9b (Z), 22 (Z), 23 (Z).

VERBENA FASCICULATA Benth.

Emended synonymy: Verbena mathewsii Briq. ex Moldenke, Phytologia 9: 115, in syn. 1963; J. Gómez, Biota 6: 103, 107, & 119. 1966.

Additional bibliography: Moldenke, Phytologia 11: 457. 1965; J. Gómez, Biota 6: 103, 107, & 119. 1966.

Gómez (1966) records the vernacular name "paraíso" for this species, a name also applied to V. cuneifolia Ruíz & Pav.

xVERBENA FECUNDA Moldenke

Additional bibliography: Moldenke, Phytologia 13: 195. 1966; G. Taylor, Ind. Kew. Suppl. 13: 143. 1966.

xVERBENA FERAX Moldenke

Additional bibliography: Moldenke, Phytologia 13: 195. 1966; G. Taylor, Ind. Kew. Suppl. 13: 143. 1966.

VERBENA FLAVA Gill. & Hook.

Additional bibliography: Darlington & Wylie, Chromosome Atl., pr. 1, 322 (1955) and pr. 2, 322. 1961; Moldenke, Phytologia 11: 458. 1965.

VERBENA GLABRATA H.B.K.

Additional bibliography: Moldenke, Phytologia 11: 458. 1965.

The A. Stewart 3317, previously cited by me as V. glabrata, is actually the type collection of V. glabrata var. tenuispicata Moldenke.

VERBENA GLABRATA var. TENUISPICATA Moldenke, var. nov.

Haec varietas a forma typica speciei spicis tenuissimis recedit.

This variety differs from the typical form of the species in having its inflorescences much branched, the peduncles and individual spikes being extremely slender, the fruits sparse and not contiguous.

The type of this variety was collected by Alban Stewart (no. 3317) at Villamil, on Albemarle Island, Galapagos Islands, on August 23, 1905, and is deposited in the Britton Herbarium at the New York Botanical Garden. The collector notes that the plant is common from 600 to 1400 feet altitude and on the floor of the crater at 2750 feet. This taxon was included by me in typical V. glabrata H.B.K. in previous installments of these notes.

Citations: GALAPAGOS ISLANDS: Albemarle: A. Stewart 3317 (Gg—31375--isotype, N--type).

VERBENA GLUTINOSA Kuntze

Additional bibliography: Moldenke, Phytologia 13: 196. 1966.

Additional citations: ARGENTINA: Mendoza: Ruíz Leal 7665/14 (Mi).

xVERBENA GOODMANI Moldenke

Additional bibliography: Moldenke, Phytologia 13: 197. 1966; G. Taylor, Ind. Kew. Suppl. 13: 143. 1966.

VERBENA GRACILESCENS (Cham.) Herter

Additional bibliography: Darlington & Wylie, Chromosome Atl., pr. 1, 323 (1955) and pr. 2, 323. 1961; Moldenke, Phytologia 13: 197. 1966.

VERBENA GRISEA Robinson & Greenm.

Additional bibliography: A. Stewart, Proc. Calif. Acad. Sci., ser. 4, 1: 134. 1911; Moldenke, Phytologia 9: 158. 1963.

The type of this rare species was collected by G. Bauer (no. 180) on Duncan Island, Galapagos Islands, in August, 1891, and is deposited in the Gray Herbarium of Harvard University at Cambridge, Mas-

sachusetts.

Additional citations: GALAPAGOS ISLANDS: Duncan: G. Bauer 180 (Du—photo of type).

VERBENA GYNOBASIS Wedd.

Additional bibliography: Bocq., Adansonia 3: [Rev. Verbenac.] 203. 1863; Moldenke, Phytologia 13: 197. 1966.

VERBENA HALEI Small

Additional bibliography: Moldenke, Phytologia 13: 247—249 & 254. 1966; Moldenke, Résumé Suppl. 14: 1. 1966.

Additional citations: TEXAS: Bell Co.: M. Latham 7 (Ld). Brown Co.: Ewing 28 (Ld); J. Wheeler 14 (Ld). Eastland Co.: Wheeless 17 (Ld). Frio Co.: Drews 6 (Ld). Kleberg Co.: J. R. Crutchfield 1088 (Ld). Medina Co.: Cope 26 (Ld). San Saba Co.: L. J. Jones 18 (Ld).

VERBENA HASSLERANA Briq.

Additional bibliography: Moldenke, Phytologia 13: 199. 1966; Stearn, Botan. Latin 295. 1966.

VERBENA HASTATA L.

Additional bibliography: Bocq., Adansonia 2: 112 (1862) and 3: 203. 1863; Bocq., Rev. Verbenac. 112 & 203. 1863; W. Stone, Ann. Rep. N. J. State Mus. 1910: 660. 1911; C. Robertson, Psyche 29: 159—173. 1922; E. W. Lathrop, Univ. Kans. Sci. Bull. 39: 173. 1958; H. C. Greene, Trans. Wisc. Acad. Sci. 53: 195. 1964; Ungar, Univ. Kans. Sci. Bull. 46: 18, 19, & 28. 1965; Percival, Flor. Biol. 131. 1965; R. B. Clarkson, Castanea 31: 100. 1966; Moldenke, Phytologia 13: 249 & 260. 1966; Rickett, Wild Fls. U. S. 1 (2): 362, pl. 112. 1966.

Additional illustrations: Rickett, Wild Fls. U. S. 1 (2): pl. 112 [in color]. 1966.

Robertson (1922) and Percival (1965) report that the oligolectic bee, Verbenajus verbenae, of the family Panurgidae, collects only from this species, V. stricta Vent., and V. urticifolia L.

Greene (1964) reports that V. hastata is host to the fungus Ascochyta cuneomaculata Greene. Lathrop found the plant growing in rocky prairie pastures in Kansas, while Ungar (1965) describes it, from the same state, as a prominent summer-bloomer in Scirpus americanus—Eleocharis rostellata communities, in the hemicryptophyte life formation on freshwater seeps, and among Distichlis stricta, Eustoma grandiflora, Asclepias incarnata, and Vernonia fasciculata as the most prominent flowering plants in the Spartina pectinata community during the summer season.

Additional citations: NEW HAMPSHIRE: Carroll Co.: A. R. Moldenke 1127 (Rf). OHIO: Brown Co.: A. R. Moldenke 1242 (Ac). Fairfield Co.: A. R. Moldenke 1238 (Ac). Lawrence Co.: A. R. Moldenke 1252 (Rf). ILLINOIS: Clay Co.: A. R. Moldenke 1254 (Ac). Fayette

Co.: A. R. Moldenke 1263 (Rf). Macoupin Co.: A. R. Moldenke 1268 (Rf). Marion Co.: A. R. Moldenke 1258 (Ac). Montgomery Co.: A. R. Moldenke 1265 (Ac). MINNESOTA: Ottertail Co.: P. Johnson 545 (Mi). KANSAS: Dickinson Co.: A. R. Moldenke 1297 (Rf). Osage Co.: A. R. Moldenke 1303 (Ac). MISSOURI: Monroe Co.: A. R. Moldenke 1279 (Rf). Ralls Co.: A. R. Moldenke 1277 (Rf). NEBRASKA: Buffalo Co.: Guthe s.n. [Kearney, Aug. 1893] (Mi). MOUNTED ILLUSTRATIONS: A. R. Moldenke Kod. 7b (Z), 8b (Z), 9a (Z), 11b (Z), 14c (Z), 16 (Z), 17 (Z), 20b (Z), 21b (Z).

VERBENA HASTATA f. ROSEA Cheney

Additional bibliography: Moldenke, Phytologia 13: 200. 1966.

Additional citations: MISSOURI: Ralls Co.: A. R. Moldenke 1276 (Rf). MOUNTED ILLUSTRATIONS: A. R. Moldenke Kod. 18 (Z), 19 (Z), 20a (Z), 21a (Z).

VERBENA HIRTA Spreng.

Additional bibliography: Moldenke, Phytologia 13: 249—250. 1966.

Reitz & Klein 17484 represents the very conspicuously white-hirsute form or stage of this species; the flowers on their no. 17400 are described as "roxa".

Additional citations: BRAZIL: Paraná: Reitz & Klein 17400 (W—2465578), 17484 (Ac).

VERBENA HIRTA var. GRACILIS Dusén

Additional bibliography: Moldenke, Phytologia 13: 250. 1966.

The flowers on Reitz & Klein 17883 are described as "roxa" — it was collected at 950 meters altitude, blooming in December.

Additional citations: BRAZIL: Paraná: Reitz & Klein 17616 (Ac), 17883 (Ac).

VERBENA HISPIDA Ruíz & Pav.

Additional bibliography: Bocq., Adansonia 2: 112 (1862) and 3: 203. 1863; Bocq., Rev. Verbenac. 112 & 203. 1863; Moldenke, Phytologia 13: 250. 1966.

Recent collectors have found this plant growing among ancient Inca ruins along with Solanum raphanifolium, S. canasense, Cassia, Bidens, Mutisia, Baccharis, Oenothera, Calceolaria, Castilleja, Veronica, Euphorbia, Rumex, Capsella, Brassica, Plantago, Cerastium, Stellaria, Hypoxis, Lupinus, and species of non-tuberous Solanum, as well as in rocky soil along open roadsides with Solanum soukupii, Senecio, Tagetes, Capsella, Brassica, Lupinus, Cerastium, and non-tuberous species of Solanum, fruiting in February. Steinbach describes the flowers "flor violeta vivo base exterior púrpurea rojiso".

Additional citations: PERU: Cuzco: Ugent & Ugent 3756 (Ws). Puno: Ugent & Ugent 4543 (Rf). BOLIVIA: Cochabamba: R. F. Stein-

bach 84 (S).

VERBENA HOOKERIANA (Covas & Schnack) Moldenke

Additional bibliography: Darlington & Wylie, Chromosome Atl., pr. 1, 323 (1955) and pr. 2, 323. 1961; Moldenke, Phytologia 13: 250 & 262. 1966.

xVERBENA HYBRIDA Voss

Additional synonymy: Verbena hybrida Grönl. & Rpl. ex Backer & Bakh., Fl. Java 2: 596. 1965.

Additional bibliography: S. Sasaki, List Pl. Formos. 353. 1928; Bodger, Electros Fls. 27, 61, 95, & 105, pl. 54g, 44le, 573c, 956a, 1137f, & 3018f. 1952; Darlington & Wylie, Chromosome Atl., pr. 1, 323 (1955) and pr. 2, 323. 1961; Clapham, Tutin, & Warburg, Fl. Brit. Isles, ed. 2, 729. 1962; Backer & Bakh., Fl. Java 2: 596. 1965; Moldenke, Phytologia 13: 250 & 253. 1966; Moldenke, Résumé Suppl. 14: 10. 1966; Harborne in T. Swain, Compar. Phytochem. 285. 1966; Herbst Bros., Seeds for Nurserymen 23 & 53. 1966.

Additional illustrations: Bodger, Electros Fls. pl. 54g, 44le, 573c [in color], 956a, 1137f, & 3018f [in color]. 1952.

Sasaki (1928) records the common names "bizyo-zakura", "hana-gasa", and "siki-zakura" for a plant which he calls V. phlogiflora Cham., cultivated in Formosa, but I suspect that his plant is actually xV. hybrida.

Bodger (1952) states that there are about 12,500 seeds of this plant per ounce. He lists V. hybrida grandiflora, V. grandiflora Mixed, V. grandiflora Brightness, and V. grandiflora Royale. He affirms that in southern California the average dates for planting this subject are January to February, the flowering takes place in July, and the harvesting of fruit in September, shipping of the seeds in October. The Herbst Brothers (1966) offer seeds of the following named varieties: Amethyst AAS 1966, Crystal (white), Dazzle, Delight (pink), Mixed, Red, Scarlet with purple eye, Splendor (purple and white), Starlight, and White. These are mostly described as dwarf forms, but also offered are Large-flowered Mixed and Early Dwarf Upright Rainbow Mixed.

xVERBENA ILLICITA Moldenke

Additional bibliography: Moldenke, Phytologia 13: 250. 1966.

Additional citations: ILLINOIS: Calhoun Co.: A. R. Moldenke 1275 (Rf). KANSAS: Wabaunsee Co.: A. R. Moldenke 1305 (Ac, Rf). MOUNTED ILLUSTRATIONS: A. R. Moldenke Kod. 1 (Z), 2 (Z), 13 (Z).

xVERBENA INTERCEDENS Briq.

Additional bibliography: Moldenke, Phytologia 13: 250. 1966.

Woolston describes this plant as an herb, 1--1.5 m. tall, erect or falling over, the flowers pale-mauve, growing in wet places in low campos, and blooming in January.

Additional citations: PARAGUAY: Woolston 785 (S).

VERBENA INTERMEDIA Gill. & Hook.

Additional bibliography: Darlington & Wylie, Chromosome Atl., pr. 1, 323 (1955) and pr. 2, 323. 1961; Moldenke, Phytologia 13: 250. 1966.

VERBENA LACINIATA (L.) Briq.

Additional bibliography: Bocq., Adansonia 3: [Rev. Verbenac.] 203. 1863; Lefroy, Bull. U. S. Nat. Mus. 25: 96. 1884; Darlington & Wylie, Chromosome Atl., pr. 1, 323 (1955) and pr. 2, 323. 1961; Backer & Bakh., Fl. Java 2: 596. 1965; Solbrig, Castanea 30: 173—174. 1966; Moldenke, Phytologia 13: 250—251, 262, & 263. 1966.

The Verbena laciniata described by Backer & Bakhuizen van den Brink (1965) from Javan gardens is V. tenuisecta Briq. as far as material seen by me is concerned. I doubt if the true V. laciniata occurs in Java. Bocquillon (1863) refers to V. laciniata as "V. erinoides Hook.", a binomial which I refer to V. berterii (Meisn.) Schau. Lefroy (1884) records V. laciniata from Bermuda, probably in error.

The A. Ruíz Leal 7665/14, distributed as V. laciniata, is actually V. glutinosa Kuntze.

VERBENA LASIOSTACHYS var. SCABRIDA Moldenke

Additional bibliography: Moldenke, Phytologia 11: 469. 1965; Hocking, Excerpt. Bot. A9: 364. 1965.

VERBENA LASIOSTACHYS var. SEPTENTRIONALIS Moldenke

Additional bibliography: Moldenke, Phytologia 11: 469. 1965; Hocking, Excerpt. Bot. A9: 364. 1965.

VERBENA LILACINA Greene

Additional bibliography: Hocking, Excerpt. Bot. A9: 364. 1965; Moldenke, Phytologia 13: 204—205. 1966.

VERBENA LINDMANII Briq.

Additional bibliography: Hocking, Excerpt. Bot. A9: 364. 1965; Moldenke, Phytologia 13: 205. 1966.

VERBENA LIPOZYGIOIDES Walp.

Additional synonymy: Verbena lipozygoïdes Walp. ex Bocq., Adansonia 3: 203. 1863.

Additional bibliography: Bocq., Adansonia 3: [Rev. Verbenac.] 203. 1863; Moldenke, Phytologia 13: 251. 1966; Moldenke, Résumé Suppl. 14: 10. 1966.

VERBENA LITORALIS H.B.K.

Additional bibliography: Bocq., Adansonia 3: [Rev. Verbenac.] 203. 1863; A. Stewart, Proc. Calif. Acad. Sci., ser. 4, 1: 134. 1911; Sampaio, Bol. Mus. Nac. Rio Jan. 13: 240 & 241. 1937; Darlington & Wylie, Chromosome Atl., pr. 1, 323 (1955) and pr. 2, 323. 1961; Moldenke, Phytologia 13: 251—252. 1965; Moldenke, Résumé Suppl. 14: 2. 1966; J. Gómez, Biota 6: 107, 116, & 119. 1966.

Recent collectors have encountered this plant in pastures, along roadsides, in cloud-forests, and in somewhat dry roadsides with Caesalpinia, Salvia, Calceolaria, and Tagetes. Feddema refers to it as "an occasional weed".

Wiggins reports the chromosome count as n = 21 for his no. 18558, but makes the qualifying statement "one cell 90 percent sure". On the Galapagos Islands the species has been found growing at the margins of trails in partial shade in the Scalesia zone, in partial shade among trees and shrubs, and "scattered in the Scalesia Zone". The flowers are described as "lavender" on I. L. Wiggins 18508, on Breedlove 11634 they were "blue", on Dressler & Jones 177 "blue-violet", and on Feddema 1667 "corolla pale-lavender, throat darker purple-lavender".

Sampaio (1937) regards V. brasiliensis Vell. as synonymous with V. litoralis and records the vernacular names "herva do pai Caetano" and "herva de pai Caetano".

A. R. Moldenke 1232, cited below under V. parvula Hayek, is regarded by my son (the collector) as a mere ecotype of V. litoralis. He tells me that V. litoralis was growing commonly all through the area where this collection was made, with varying forms of stature, and that the above-mentioned collection merely represents its smallest alpine form. If this is an accurate description of the situation, then it is possible that Hayek's binomial should be reduced to form status under V. litoralis.

Additional citations: MEXICO: Michoacán: Feddema 1667 (Mi). Vera Cruz: Dressler & Jones 177 (Mi). GUATEMALA: Huehuetenango: Breedlove 11634 (Rf). COSTA RICA: Alajuela: A. R. Moldenke 1203 (Ac). Cartago: A. R. Moldenke 1320 (Rf). Guanacaste: A. R. Moldenke 1220 (Ac). Limón: A. R. Moldenke 1319 (Rf). San José: A. R. Moldenke 1201 (Ac). COLOMBIA: Cundinamarca: Larsson s.n. "Quetame, Oct. 1964] (S). PERU: Cajamarca: Ugent & Ugent 5512 (Ac). GALAPAGOS ISLANDS: Charles: Itow 179 (Du—564532). Indefatigable: R. I. Bowman s.n. [Oct. 5/57] (Gg—461948); I. L. Wiggins 18508 (Du—564528), 18558 (Du—564539).

VERBENA LONGIFOLIA Mart. & Gal.

Additional bibliography: Moldenke, Phytologia 13: 251 & 252. 1966; Moldenke, Résumé Suppl. 14: 2. 1966.

VERBENA LONGIFOLIA var. PUBESCENS Moldenke

Bibliography: Moldenke, Phytologia 13: 307. 1966; Moldenke, Résumé Suppl. 14: 2. 1966.

Citations: MEXICO: Oaxaca: Breedlove 12292 (Z—type).

VERBENA LUCANENSIS Moldenke

Additional bibliography: Hocking, Excerpt. Bot. A9: 365. 1965; Moldenke, Phytologia 13: 207. 1966.

VERBENA MACDOUGALII Heller

Additional bibliography: Hocking, Excerpt. Bot. A9: 365. 1965; Moldenke, Phytologia 13: 208. 1966.

VERBENA MACROSPERMA Speg.

Additional bibliography: Moldenke, Phytologia 10: 119—121. 1964; Hocking, Excerpt. Bot. A9: 365. 1965.

VERBENA MARITIMA Small

Additional bibliography: Hocking, Excerpt. Bot. A9: 365. 1965; Moldenke, Phytologia 13: 208. 1966.

VERBENA MARRUBIOIDES Cham.

Additional bibliography: Hocking, Excerpt. Bot. A9: 365. 1965; Moldenke, Phytologia 13: 208. 1966.

xVERBENA MATRITENSIS Moldenke

Additional bibliography: Moldenke, Phytologia 10: 129. 1964; Hocking, Excerpt. Bot. A9: 365. 1965.

VERBENA MEGAPOTAMICA Spreng.

Additional bibliograohy: Darlington & Wylie, Chromosome Atl., pr. 1, 323 (1955) and pr. 2, 323. 1961; Hocking, Excerpt. Bot. A9: 365. 1965; Moldenke, Phytologia 13: 208—209. 1966.

VERBENA MENDOCINA R. A. Phil.

Additional bibliography: Darlington & Wylie, Chromosome Atl., pr. 1, 323 (1955) and pr. 2, 323. 1961; Moldenke, Phytologia 13: 252 & 271. 1966.

VERBENA MENTHAEFOLIA Benth.

Additional bibliography: Moldenke, Phytologia 13: 252 & 276. 1966; Moldenke, Résumé Suppl. 14: 2. 1966.

Recent collectors have encountered this plant in grazed areas near roadsides, on steep slopes with Quercus and Pinus, in cornfields, and in weedy patches between irrigation ditches, growing in association with Solanum michoacanum, S. bulbocastanum, S. stoloniferum, Physalis, Gaura, Oenothera, and Hypericum.

Additional citations: MEXICO: Chiapas: Breedlove 11161 (Ac). Michoacán: Ugent, Ugent, & Flores C. 5802 (Ws). Sinaloa: Feddema 1808 (Mi).

VERBENA MICROPHYLLA H.B.K.

Additional bibliography: Bocq., Adansonia 3: [Rev. Verbenac.] 203. 1863; Moldenke, Phytologia 13: 252, 253, 262, & 271. 1966.

Recent collectors have found this plant growing along lake shores, in open village fields, on bare clay banks with Solanum acaule, and on vast Ichu-tussock grasslands with a few small round cacti, Solanum acaule, Tetraglochin (strictum?), and a few other small shrubs, with calcareous outcrops.

Additional citations: PERU: Puno: Iltis & Iltis s.n. [10 km. SW. of Puno on road to Llave, Jan. 10, 1963] (Ac); Iltis, Iltis, Ugent, & Ugent 1376 (Ws); Iltis & Ugent 1393 (Rf).

VERBENA MINUTIFLORA Briq.

Additional bibliography: Moldenke, Phytologia 13: 252. 1966; G. Taylor, Ind. Kew. Suppl. 13: 143. 1966.

The flowers on Reitz & Klein 17805 are described as "roxa".

Additional citations: BRAZIL: Paraná: Reitz & Klein 17805 (Ac).

xVERBENA MOECHINA Moldenke

Additional bibliography: E. W. Lathrop, Univ. Kans. Sci. Bull. 39: 173. 1958; Hocking, Excerpt. Bot. A9: 365. 1965; Moldenke, Phytologia 13: 210. 1966.

Lathrop (1958) states that this plant may be looked for in prairie pastures and on open wooded hillsides in Kansas.

VERBENA MONTEVIDENSIS Spreng.

Additional bibliography: Darlington & Wylie, Chromosome Atl., pr. 1, 323 (1955) and pr. 2, 323. 1961; Moldenke, Phytologia 13: 252. 1966.

VERBENA NEOMEXICANA (A. Gray) Small

Additional bibliography: Hocking, Excerpt. Bot. A9: 365. 1965; Moldenke, Phytologia 13: 211. 1966.

VERBENA NEOMEXICANA var. HIRTELLA Perry

Additional bibliography: Hocking, Excerpt. Bot. A9: 365. 1965; Moldenke, Phytologia 13: 211. 1966.

The flowers are described as "lavender" on D. S. Correll 33855. The plant has been found growing on talus slopes. The G. L. Webster 453, distributed as this variety, is actually V. plicata Greene.

Additional citations: TEXAS: Brewster Co.: D. S. Correll 33855 (Ld).

VERBENA NEOMEXICANA var. XYLOPODA Perry

Additional bibliography: Hocking, Excerpt. Bot. A9: 365. 1965; Moldenke, Phytologia 13: 211. 1966.

VERBENA OFFICINALIS L.

Additional & emended bibliography: Röhl., Deutschl. Fl., ed. 1, 2: 329. 1812; W. D. J. Koch in Röhl., Deutschl. Fl., ed. 2, 4: 339. 1833; W. D. J. Koch, Syn. Fl. Germ., ed. 1, 578. 1837; W. D. J. Koch, Syn. Deutsch. & Schw. Fl., ed. 1, 575—576. 1838; Meigen, Deutschl. Fl. 3: 130. 1842; W. D. J. Koch, Taschenb. Deutsch. Fl., ed. 1, 417. 1843; W. D. J. Koch, Syn. Fl. Germ., ed. 2, 2: 664. 1844; W. D. J. Koch, Syn. Deutsch. & Schw. Fl., ed. 2, 681—682. 1846; G. & F. Lorinser, Taschenb. Fl. Deutschl., ed. 1, 311 (1847) and ed. 2, 311. 1851; W. D. J. Koch, Taschenb. Deutsch. Fl., ed. 3, 417 (1851) and ed. 4, 400. 1856; Langmann, Fl. Nord- & Mittel-

deutsch., ed. 2, 252—253. 1856; W. D. J. Koch, Taschenb. Deutsch. Fl., ed. 5, 400. 1860; Bocq., Adansonia 2: 107 & 154 (1862) and 3: 203. 1863; Bocq., Rev. Verbenac. 107, 154, & 203. 1863; W. D. J. Koch, Taschenb. Deutsch. Fl., ed. 6, 400. 1865; Langethal, Beschreib. Gew. Deutsch., ed. 2, 448. 1868; Miq., Cat. Mus. Bot. Lugd.-Bat. 70. 1870; E. Hall. in W. D. J. Koch, Taschenb. Deutsch Fl., ed. 7, 403 (1878) and ed. 8, 403. 1881; K. G. Lutz, Pflanzenfr. 93, pl. 17, fig. 19. 1887; W. Medic., Illustr. Pflanzenb. viii, xxxix, & 115, pl. 50, fig. 112 & 112a. 1893; J. Matsum., Bot. Mag. Tokyo 13: [113]—114. 1899; Ichimura, Bot. Mag. Tokyo 13: 116. 1899; Migula, Exkursionsfl. Deutsch. 2: 134. 1906; Kawakami, List Pl. Formos. 85. 1910; A. Stewart, Proc. Calif. Acad. Sci., ser. 4, 1: 134. 1911; Dunn & Tutcher, Kew Bull. Misc. Inf. Addit. Ser. 10: 202. 1912; Turrill, Kew Bull. Misc. Inf. 1924: 359. 1924; S. Sasaki, List Pl. Formos. 353. 1928; Hand.-Mazz., Ann. Hort. Gothenb. 9: [67]. 1934; Fletcher, Kew Bull. Misc. Inf. 1938: 410—411. 1938; Blakelock, Kew Bull. Misc. Inf. 1949: 539. 1949; K. H. Rechinger, Arkiv Bot., ser. 2, 2: 408. 1952; Bor & Raizada, Some Beaut. Ind. Climbers [136]. 1954; Darlington & Wylie, Chromosome Atl., pr. 1, 323. 1955; De Miré & Gillet, Journ. Agric. Trop. 3: 721. 1956; Mostert, Bot. Surv. S. Afr. Mem. 31: 41 & 191. 1958; T. A. Rao, Bull. Bot. Surv. Ind. 1: 114. 1959; K. H. Rechinger, Arkiv Bot., ser. 2, 5: 346. 1959; Anon., Kew Bull. Gen. Index 1929-1956, 291. 1959; Nath, Bot. Surv. South. Shan States 143. 1960; Darlington & Wylie, Chromosome Atl., pr. 2, 323. 1961; Clapham, Tutin, & Warburg, Fl. Brit. Isles, ed. 2, 730. 1962; Lid, Norsk & Svensk. Fl. 568 & 569, fig. 341a. 1963; Quezel & Santa, Nouv. Fl. Algérie 2: 780. 1963; Hepper in Hutchinson & Dalz., Fl. W. Trop. Afr., ed. 2, 2: 434. 1963; Backer & Bakh., Fl. Java 2: 596. 1965; Moldenke, Phytologia 13: 253. 1966; Kitamura, Results Kyoto Univ. Scient. Exped. Karakoram 8: 132. 1966; Rickett, Wild Fls. U. S. 1 (2): 362. 1966; G. B. Foster, Herbs for Every Gard. 199. 1966; Ross-Craig, Drawings Brit. Pl. 23: pl. 38. 1966.

Additional illustrations: K. G. Lutz, Pflanzenfr. pl. 17, fig. 19 [in color]. 1887; W. Medic., Illustr. Pflanzenb. pl. 50, fig. 112 & 112a [in color]. 1893; Lid, Norsk & Svensk. Fl. fig. 341a. 1963; Ross-Craig, Drawings Brit. Pl. 23: pl. 38. 1966.

Rao (1959) describes this plant as an "herb with many long spikes bearing white flowers", growing at 1300 to 1615 meters altitude in India, and cites his no. 6539. Mostert (1958) avers that it grows on streambanks, dams, pans, flooded and irrigated areas subject to wetness and drought, severe grazing, and trampling, and is "common in wet situations" in South Africa. Ross-Craig (1966) describes the corolla as "very delicate lilac-mauve", with the "lower part of tube pinkish-crimson" and the leaves "bright medium-green", paler beneath. Lid (1963) records the Scandinavian names "jernurt" and "järnört". Formosan common names are "bé-pin-chhau", "kumatudura", "kuma-tzurzura", "marupoyopoyomu", "tê-bi-chháu", "thih-be-pin", and "thih-tiò-koan".

Nath (1960) records the species as both cultivated and escaped in Burma; Quezel & Santa (1963) say that it is found throughout

Algeria, that it is a paleo-temperate plant, and that it is called "ben noul" there. Blakelock (1949) cites Guest & Ludlow-Hewitt 2910, 2994, & 3041 and Lazar 3442 & 3638 from Iraq.

The Felizardo s.n., distributed as V. officinalis, is actually something in the Rubiaceae.

Additional citations: JUGOSLAVIA: Istria: Starbäck J.17 (S). ZAMBIA: E. A. Robinson 5596 (S).

VERBENA OVATA Cham.

Additional bibliography: Darlington & Wylie, Chromosome Atl., pr. 1, 323 (1955) and pr. 2, 323. 1961; Moldenke, Phytologia 13: 213. 1966.

Woolston describes this plant as an erect herb, with mauve flowers.

Additional citations: PARAGUAY: Woolston 916 (S).

VERBENA PARANENSIS Moldenke

Additional bibliography: Moldenke, Phytologia 13: 213. 1966; G. Taylor, Ind. Kew. Suppl. 13: 143. 1966.

VERBENA PARODII (Covas & Schnack) Moldenke

Additional bibliography: Darlington & Wylie, Chromosome Atl., pr. 1, 323 (1955) and pr. 2, 323. 1961; Moldenke, Phytologia 13: 252, 253, & 271. 1966; Moldenke, Résumé Suppl. 14: 3. 1966.

VERBENA PARVULA Hayek

Additional bibliography: Moldenke, Phytologia 10: 297 (1964) and 13: 214. 1966.

Recent collectors have encountered this species on high alpine valley floors, on sunny lichen-covered rock-walls, rock-piles, terraces, and cliffs among ancient Inca ruins, growing in association with Solanum raphanifolium, S. canasense, Cassia, Bidens, Mutisia, Baccharis, Oenothera, Calceolaria, Castilleja, Veronica, Euphorbia, Rumex, Capsella, Brassica, Plantago, Cerastium, Stellaria, Hypoxis, Lupinus, and non-tuberous species of Solanum.

Iltis & Ugent describe the plant as having weak and more or less decumbent branches, and report it as a common weed in pastures and fallow vegetable garden fields, flowering in December, fruiting in May and December. The flowers on Saunders 363 are said to have been purple, while those on Iltis & Ugent 699 were "violet".

The Hammarlund 167 & 196, cited by me in Phytologia 10: 297 (1964), prove on re-examination to be V. weberbaueri Hayek.

My son, Andrew R. Moldenke, who collected a specimen of what appears to me to be V. parvula for the first time in Costa Rica, is of the opinion that his specimen, at least, represents merely an alpine ecotype of V. litoralis H.B.K. He affirms that the latter species was common in the area and of various forms of stature, and that his collection represents merely the most dwarf form seen. If this is correct, then perhaps Hayek's species ought

to be reduced to form rank under V. litoralis; or perhaps the Costa Rican plant is not identical with the South American plant passing as V. parvula.

Additional citations: COSTA RICA: Cartago: A. R. Moldenke 1232 (Rf). PERU: Apurimac: Iltis & Ugent 699 (Rf). Cuzco: D. Ugent 5350 (Ws); Ugent & Ugent 3749 (Ac). Lima: S. G. E. Saunders 363 (Mi).

VERBENA PERAKII (Covas & Schnack) Moldenke

Additional bibliography: Darlington & Wylie, Chromosome Atl., pr. 1, 323 (1955) and pr. 2, 323. 1961; Moldenke, Phytologia 13: 214. 1966.

VERBENA PERUVIANA (L.) Britton

Additional bibliography: Bocq., Adansonia 2: 107 (1862) and 3: 202. 1863; Bocq., Rev. Verbenac. 107 & 202. 1863; Gamble, Fl. Madras 1106. 1924; Sampaio, Bol. Mus. Nac. Rio Jan. 13: 190. 1937; Darlington & Wylie, Chromosome Atl., pr. 1, 323 (1955) and pr. 2, 323. 1961; Clapham, Tutin, & Warburg, Fl. Brit. Isles, ed. 2, 729. 1962; Backer & Bakh., Fl. Java 2: 596. 1965; Hocking, Excerpt. Bot. A9: 365. 1965; Moldenke, Phytologia 13: 215. 1966.

Sampaio (1937) records for this plant the additional vernacular name "jurujuba".

VERBENA PERUVIANA f. ALBA Moldenke

Additional bibliography: Hocking, Excerpt. Bot. A9: 365. 1965; Moldenke, Phytologia 13: 215. 1966.

VERBENA PERUVIANA var. GLABRIUSCULA Kuntze

Additional bibliography: Hocking, Excerpt. Bot. A9: 365 & 366. 1965; Moldenke, Phytologia 13: 215—216. 1966.

VERBENA PHLOGIFLORA Cham.

Additional bibliography: Bocq., Adansonia 3: [Rev. Verbenac.] 203. 1863; S. Sasaki, List Pl. Formos. 353. 1928; Darlington & Wylie, Chromosome Atl., pr. 1, 323. 1955; Nath, Bot. Surv. South. Shan States 143. 1960; Darlington & Wylie, Chromosome Atl., pr. 2, 323. 1961; Moldenke, Phytologia 13: 253. 1966.

The flowers on Reitz & Klein 17786 are described as "roxa". Sasaki (1928) reports the Japanese common names "bizyo-zakura", "hana-gasa", and "siki-zakura", but I suspect that the plants to which these names are applied are actually xV. hybrida Voss. Similarly, Nath (1960) records V. phlogiflora as cultivated in Burma, but, here again, he is probably referring to the commonly cultivated xV. hybrida.

Additional citations: BRAZIL: Paraná: Reitz & Klein 17786 (Ac).

VERBENA PLATENSIS Spreng.

Additional bibliography: Bocq., Adansonia 3: [Rev. Verbenac.] 203. 1863; Darlington & Wylie, Chromosome Atl., pr. 1, 323 (1955)

and pr. 2, 323. 1961; Moldenke, Phytologia 13: 254. 1966.

VERBENA PLICATA Greene

Additional bibliography: Moldenke, Phytologia 13: 247, 248, & 254. 1966; Moldenke, Résumé Suppl. 14: 1 & 10. 1966.

Webster found this species growing in mesquite scrub.

The B. E. Holland 21, distributed as V. plicata, is actually V. canescens var. roemeriana (Scheele) Perry.

Additional citations: TEXAS: Brewster Co.: D. S. Correll 34072 (Ld). Brown Co.: R. Fryar 28 (Ld). Terrell Co.: G. L. Webster 453 (Mi).

VERBENA POGOSTOMA Klotzsch

Additional bibliography: Moldenke, Phytologia 13: 217—218 & 271. 1966.

VERBENA PULCHELLA Sweet

Additional bibliography: Bocq., Adansonia 2: 106, 107, 131, & 132. 1862; Bocq., Rev. Verbenac. 106, 107, 131, & 132. 1863; Moldenke, Phytologia 13: 254—256, 261—263, & 267—272. 1966; Moldenke, Résumé Suppl. 14: 9. 1966; Solbrig, Castanea 30: 173—174. 1966.

VERBENA PULCHELLA var. CLAVELLATA (Troncoso) Shinners

Synonymy: Glandularia pulchella var. clavellata Troncoso, Darwiniana 13: 475 & 476, fig. 3. 1964.

Bibliography: Troncoso, Darwiniana 13: 475 & 476, fig. 3. 1964; Shinners, Sida 2: 266. 1966; Moldenke, Phytologia 13: 255. 1966; Moldenke, Résumé Suppl. 14: 9. 1966.

Illustrations: Troncoso, Darwiniana 13: 475, fig. 3. 1964.

VERBENA PUMILA Rydb.

Additional bibliography: Moldenke, Phytologia 13: 256—257. 1966.

Additional citations: TEXAS: Brown Co.: Faubion 6 (Ld). Foard Co.: C. Turner 14 (Ld). Henderson Co.: C. Turner 5 (Ld). San Saba Co.: Calhoun 9 (Ld).

VERBENA PUMILA f. ALBIDA Moldenke

Additional bibliography: Moldenke, Phytologia 13: 256 & 257. 1966.

VERBENA QUADRANGULATA Heller

Additional bibliography: Moldenke, Phytologia 13: 247 & 257—258. 1966.

VERBENA RACEMOSA Eggert

Additional bibliography: Darlington & Wylie, Chromosome Atl., pr. 1, 323 (1955) and pr. 2, 323. 1961; Moldenke, Phytologia 13: 258. 1966.

VERBENA RADICATA Moldenke

Additional bibliography: Darlington & Wylie, Chromosome Atl., pr. 1, 323 (1955) and pr. 2, 323. 1961; Moldenke, Phytologia 13: 258. 1966.

VERBENA RAMBOI Moldenke

Additional bibliography: Moldenke, Phytologia 13: 258 & 264. 1966.

VERBENA RECTA H.B.K.

Additional bibliography: Moldenke, Phytologia 13: 258. 1966.

Rzedowski encountered this plant in open pinewoods with abundant grasses, at 3000 meters altitude.

Additional citations: MEXICO: Federal District: J. Rzedowski 20443a (Mi).

VERBENA REITZII Moldenke

Additional bibliography: Moldenke, Phytologia 13: 258—259. 1966; Moldenke, Résumé Suppl. 14: 3. 1966.

VERBENA REITZII var. CASTRENSIS Moldenke

Additional bibliography: Moldenke, Phytologia 13: 259. 1966; Moldenke, Résumé Suppl. 14: 3. 1966.

VERBENA RIBIFOLIA Walp.

Additional bibliography: Bocq., Adansonia 3: [Rev. Verbenac.] 203. 1863; Moldenke, Phytologia 13: 259. 1966.

VERBENA RIGIDA Spreng.

Additional synonymy: Verbena venosa Hook. ex Bocq., Adansonia 3: 203. 1863.

Additional bibliography: Bocq., Adansonia 3: [Rev. Verbenac.] 203. 1863; Gamble, Fl. Madras 1106. 1924; Darlington & Wylie, Chromosome Atl., pr. 1, 323 (1955) and pr. 2, 323. 1961; Backer & Bakh., Fl. Java 2: 596. 1965; Moldenke, Phytologia 13: 259—260. 1966; Moldenke, Résumé Suppl. 14: 1 & 10. 1966.

In Jamaica recent collectors have found this plant growing at 2600 to 3400 feet altitude, and describe it as "common on roadsides". The flowers on Webster & Proctor 5249 are described as "lavender", while Crosby, Hespenheide, & Anderson 427 had "calyx green below to tinged purple above, corolla purple, white where covered by calyx, the hairs white, filaments white, anthers light yellow-green, style white below to purplish near stigma, stigma purplish".

Additional citations: GEORGIA: Baldwin Co.: H. N. Moldenke 23036 (Ac). JAMAICA: Crosby, Hespenheide, & Anderson 427 (Mi); Webster & Proctor 5249 (Mi). BRAZIL: Paraná: Reitz & Klein 17672 (Ac).

VERBENA RIPARIA Raf.

Additional bibliography: Moldenke, Phytologia 11: 479. 1965;

Rickett, Wild Fls. U. S. 1 (2): 362. 1966.

VERBENA RUNYONI Moldenke

Additional bibliography: Moldenke, Phytologia 13: 260. 1966.

Runyon describes this plant as a "tall erect plant with opposite leaves and hollow stems", scarce on clay soil in damp situations.

Additional citations: TEXAS: Cameron Co.: R. Runyon 6011 (Ld).

xVERBENA RYDBERGII Moldenke

Additional bibliography: E. W. Lathrop, Univ. Kans. Sci. Bull. 39: 173. 1958; Moldenke, Phytologia 13: 260—261. 1966.

One of the A. R. Moldenke 819 specimens, cited previously as deposited in my personal herbarium, is now in that of the Texas Research Foundation at Renner, Texas. Lathrop (1958) tells us that this plant may be expected in overgrazed prairie pastures, prairie woodlands, and waste places in Kansas, and this agrees completely with the observations of my son and myself.

Additional citations: KANSAS: Dickinson Co.: A. R. Moldenke 1298 (Rf). Jackson Co.: A. R. Moldenke 1314 (Ac). Osage Co.: A. R. Moldenke 1304 (Ac). MISSOURI: Monroe Co.: A. R. Moldenke 1280 (Rf). MOUNTED ILLUSTRATIONS: A. R. Moldenke Kod. 4 (Z), 5 (Z), 6 (Z), 7a (Z), 8a (Z), 10 (Z), 12 (Z), 14b (Z).

VERBENA SANTIAGUENSIS (Covas & Schnack) Moldenke

Additional bibliography: Darlington & Wylie, Chromosome Atl., pr. 1, 323 (1955) and pr. 2, 323. 1961; Moldenke, Phytologia 13: 261. 1966.

VERBENA SCABRA Vahl

Additional bibliography: Moldenke, Phytologia 13: 261. 1966; Rickett, Wild Fls. U. S. 1 (2): 364. 1966.

In Jamaica this species is reported to be "common in the drier areas of swampy country". The flowers on Webster & Proctor 5334 are described as "lavender", while those on Webster & Wilson 5051 were "pale-blue". The two latter collectors describe the plant as an annual.

Additional citations: LOUISIANA: Orleans Par.: T. Drummond s.n. [New Orleans, 1833] (S). JAMAICA: Webster & Proctor 5334 (Mi); Webster & Wilson 5051 (Mi).

VERBENA SCABRA f. ANGUSTIFOLIA Moldenke, f. nov.

Haec forma a forma typica speciei laminis foliorum anguste vel angistissime ellipticis vel elliptico-lanceolatis recedit.

This form differs from the typical form of the species in having its leaf-blades narrowly or very narrowly elliptic or elliptic-lanceolate, 3—6.5 cm. long, 0,5—2 cm. wide, attenuate-acute at the apex, with the margins sharply and irregularly mucronulate-serrate.

The type of the form was collected by John R. Crutchfield (no. 1837) in moist black loam at the edge of Beaver Creek, Burnet

County, Texas, on July 21, 1966, and is deposited in the Lundell Herbarium at Renner, Texas. The collector states that the flowers are light-pink. While leaves approximating these in size and shape are sometimes seen in and near the young inflorescences in the typical form of the species, in the present form they are uniform to the base of the plant.

Citations: TEXAS: Burnet Co.: J. R. Crutchfield 1837 (Ld—type).

VERBENA SEDULA Moldenke

Additional bibliography: Moldenke, Phytologia 11: 140—141. 1964.

Bowman found this plant growing at 2500 feet altitude on the north slope of the main peak on Indefatigable Island, with white flowers in February. Material has been misidentified and distributed in herbaria as V. carolina L.

Additional citations: GALAPAGOS ISLANDS: Indefatigable: R. I. Bowman 81 (Gg—461129).

VERBENA SELLOI Spreng.

Additional bibliography: Moldenke, Phytologia 13: 247, 248, 251, 255, 256, 261—264, 267, 270, & 271. 1966; Moldenke, Résumé Suppl. 14: 3, 5, & 9. 1966.

VERBENA SIMPLEX Lehm.

Additional bibliography: Bocq., Adansonia 2: 113 (1862) and 3: 202. 1863; Bocq., Rev. Verbenac. 113 & 202. 1863; W. Stone, Ann. Rep. N. J. State Mus. 1910: 661. 1911; Brehan, Kew Bull. Misc. Inf. 1950: 226. 1950; E. W. Lathrop, Univ. Kans. Sci. Bull. 39: 173. 1958; Moldenke, Phytologia 13: 251, 264, & 265. 1966; Rickett, Wild Fls. U. S. 1 (2): 362, pl. 112. 1966.

Additional illustrations: Rickett, Wild Fls. U. S. 1 (2): pl. 112 [in color]. 1966.

Lathrop (1958) tells us that in Kansas this plant may be found in prairie pastures, rocky prairie woodlands, and open oak woods.

xVERBENA SOLBRIGII Moldenke

Additional bibliography: Moldenke, Phytologia 13: 264. 1966; G. Taylor, Ind. Kew. Suppl. 13: 143. 1966.

VERBENA STELLARIOIDES Cham.

Additional bibliography: Moldenke, Phytologia 13: 258 & 264—265. 1966.

VERBENA STRICTA Vent.

Additional bibliography: Bocq., Adansonia 3: [Rev. Verbenac.] 203. 1863; C. Robertson, Psyche 29: 159—173. 1922; E. W. Lathrop, Univ. Kans. Sci. Bull. 39: 124 & 173. 1958; Ungar, Univ. Kans. Sci. Bull. 46: 28. 1965; Percival, Flor. Biol. 131. 1965; R. B. Clarkson, Castanea 31: 100. 1966; Rickett, Wild Fls. U. S. 1 (2): 362, pl. 112. 1966; Moldenke, Phytologia 13: 260, 261, & 265. 1966.

Additional illustrations: Rickett, Wild Fls. U. S. 1 (2): pl. 112 [in color]. 1966.

Robertson (1922) and Percival (1965) report that the oligolectic bee, Verbenajus verbenae, a member of the family Panurgidae, collects only from this species, V. hastata L., and V. urticifolia L.

Lathrop (1958) states that in Kansas V. stricta is found in rocky prairie gullies, overgrazed pastures, fields, and open floodplain woods, while Ungar (1965) found it in the hemicryptophyte formation on prairies and freshwater seeps.

Additional citations: ILLINOIS: Calhoun Co.: A. R. Moldenke 1274 (Ac). Greene Co.: A. R. Moldenke 1271 (Rf). Macoupin Co.: A. R. Moldenke 1266 (Ac). Montgomery Co.: A. R. Moldenke 1264 (Rf). KANSAS: Dickinson Co.: A. R. Moldenke 1299 (Ac, Rf). Nemaha Co.: H. N. Moldenke 23128 (Ac, Rf). Shawnee Co.: H. N. Moldenke 23140 (Rf). Wabaunsee Co.: A. R. Moldenke 1288 (Rf). NEBRASKA: Buffalo Co.: Guthe s.n. [Kearney, July 1893] (Mi). MOUNTED ILLUSTRATIONS: A. R. Moldenke Kod. 3 (Z), 11a (Z), 14a (Z), 15 (Z).

VERBENA STRIGOSA Cham.

Additional bibliography: Bocq., Adansonia 3: [Rev. Verbenac.] 203. 1863; Moldenke, Phytologia 13: 265--266. 1966.

VERBENA SUBINCANA (Troncoso) Shinners

Additional bibliography: Moldenke, Phytologia 13: 255, 256, 266--268, & 270. 1966; Moldenke, Résumé Suppl. 14: 9. 1966.

VERBENA SULPHUREA D. Don

Additional bibliography: Bocq., Adansonia 2: 126 (1862) and 3: 203. 1863; Bocq., Rev. Verbenac. 126 & 203. 1863; Moldenke, Phytologia 13: 268. 1966.

VERBENA SUPINA L.

Additional bibliography: Meigen, Deutschl. Fl. 3: 130. 1842; Bocq., Adansonia 3: [Rev. Verbenac.] 203. 1863; Blakelock, Kew Bull. Misc. Inf. 1949: 539. 1949; Berhaut, Fl. Sénegal 65. 1954; Anon., Kew Bull. Gen. Index 1929-1956, 291. 1959; Quezal & Santa, Nouv. Fl. Algérie 2: 780. 1963; Hepper in Hutchinson & Dalz., Fl. W. Trop. Afr., ed. 2, 2: 434. 1963; Moldenke, Phytologia 13: 268. 1966; Anon., Assoc. Etud. Tax. Fl. Afr. Trop. Index 1965: 67. 1966.

Quezel & Santa (1963) state that this plant is found throughout Algeria, is Mediterranean in general distribution, and is called "djaïda" in Algeria. Hepper (1963) describes the species as follows and cites the following specimens: "A small annual herb 2—12 in. tall, appearing gray-green; flowers very small, lilac; in seasonally flooded ground: MAURITANIA: Popov 15. SENEGAL: Berhaut 554. MALI: Davey 440; also in Sudan, Ethiopia, and around the Mediterranean." Blakelock (1949) cites Lazar 1181 from Iraq.

VERBENA SUPINA f. ERECTA Moldenke

Additional bibliography: Moldenke, Phytologia 11: 481. 1965; Anon., Assoc. Etud. Tax. Fl. Afr. Trop. Index 1965: 67. 1966.

VERBENA TENERA Spreng.

Additional bibliography: Bocq., Adansonia 3: [Rev. Verbenac.] 203. 1863; Darlington & Wylie, Chromosome Atl., pr. 1, 323. 1955; Mostert, Bot. Surv. S. Afr. Mem. 31: 41 & 191. 1958; Darlington & Wylie, Chromosome Atl., pr. 2, 323. 1961; Hepper in Hutchinson & Dalz., Fl. W. Trop. Afr., ed. 2, 2: 434. 1963; Moldenke, Phytologia 13: 214, 217, 252, 253, 255, 256, 262, 263, & 268—273. 1966.

Mostert (1958) speaks of this species as a garden escape in South Africa, but he is probably referring to V. tenuisecta Briq., a far more widely cultivated species. Hepper (1963) refers to V. tenera as "a creeping herb with very dissected leaves and white or violet flowers" and notes that it "has been introduced into Nigeria (Obubra Dist., FHI 43964)", but here again it is probably V. temuisecta that is the species involved.

VERBENA TENERA var. ALBIFLORA Kuntze

Additional bibliography: Moldenke, Phytologia 11: 253 & 276. 1965.

The Venturi 5267, cited by me as this variety in Phytologia 11: 276 (1965), is actually V. parodii (Covas & Schnack) Moldenke.

VERBENA TENUISECTA Briq.

Additional bibliography: Mostert, Bot. Surv. S. Afr. Mem. 31: 41 & 191. 1958; Hepper in Hutchinson & Dalz., Fl. W. Trop. Afr., ed. 2, 2: 434. 1963; Liogier, Rhodora 67: 349. 1965; Solbrig, Castanea 30: 173—174. 1966; Moldenke, Phytologia 13: 246, 255, 262, 263, & 270—273. 1966; Moldenke, Résumé Suppl. 14: 1 & 10. 1966.

The flowers on Reitz & Klein 17728 are described as "roxa". Mostert (1958) refers to V. tenera Spreng. as a garden escape in South Africa, but is probably referring to V. temuisecta. Hepper (1963) speaks of a V. tenera Spreng. introduced into Nigeria — "a creeping herb with very dissected leaves and white or violet flowers", but the plant to which he refers is almost certainly V. temuisecta. He cites FHI 43964 from the Obubra District.

Woolston refers to V. tenuisecta as a "semi-procumbent herb."

Additional citations: TEXAS: Harris Co.: H. Spoon 21 (Ld). BRAZIL: Paraná: Reitz & Klein 17728 (Ac). PARAGUAY: Woolston 254 (S).

VERBENA TEUCRIIFOLIA Mart. & Gal.

Additional bibliography: Moldenke, Phytologia 13: 273—274. 1966.

Recent collectors have found this plant growing at the edges of Pinus-Quercus woods and grazed fields, along rock-brush walls with Solanum stenophyllidium, S. inscendens, and Rubus, and in oak

woods with Cassia, Solanum stoloniferum, S. skutchii, S. appendiculatum, S. rostratum, and very many different kinds of herbaceous and tree-like species of Solanum.

Additional citations: MEXICO: Michoacán: Feddema 1684 (Mi); Ugent & Flores C. 2165 (Ws). Vera Cruz: Ugent & Flores C. 2428 (Ws).

VERBENA THYMOIDES Cham.

Additional synonymy: Verbena thymoides L. ex Bocq., Adansonia 3: 203, sphalm. 1863.

Additional bibliography: Bocq., Adansonia 3: [Rev. Verbenac.] 203. 1863; Moldenke, Phytologia 13: 274. 1966; Moldenke, Résumé Suppl. 14: 10. 1966.

VERBENA TRIFIDA H.B.K.

Additional bibliography: Bocq., Adansonia 3: [Rev. Verbenac.] 203. 1863: Moldenke, Phytologia 11: 318--320. 1965.

VERBENA URTICIFOLIA L.

Additional bibliography: Bocq., Adansonia 3: [Rev. Verbenac.] 203. 1863; W. Stone, Ann. Rep. N. J. State Mus. 1910: 660. 1911; C. Robertson, Psyche 29: 159--173. 1922; H. C. Greene, Trans. Wisc. Acad. Sci. 42: 70. 1953; E. W. Lathrop, Univ. Kans. Sci. Bull. 39: 135 & 173. 1958; H. C. Greene, Trans. Wisc. Acad. Sci. 53: 194--195. 1964; Percival, Flor. Biol. 131. 1965; R. B. Clarkson, Castanea 31: 100. 1966; Rickett, Wild Fls. U. S. 1 (2): 362-364, pl. 113. 1966; Moldenke, Phytologia 13: 274--275. 1966.

Additional illustrations: Rickett, Wild Fls. U. S. 1 (2): pl. 113 [in color]. 1966.

Robertson (1922) and Percival (1965) report that the oligolectic bee, Verbenajus verbenae, a member of the family Panurgidae, collects only from this species, V. hastata L., and V. stricta Vent. "The flowers have the anthers included in the narrow-tubed corolla; and the bee extracts the pollen by inserting its front tarsi into the tube and drawing it up with its curled spines".

Greene (1964) reports that this plant is host to the fungus, Ascochyta cuneomaculata Greene. In Kansas, Lathrop (1958) tells us to look for V. urticifolia in the understory of floodplain woods, where it is prominent in autumn, in creek valley thickets, low prairie pastures, and waste places.

The T. Drummond s.n. [New Orleans, 1833], distributed as V. urticifolia, is actually V. scabra Vahl.

Additional citations: OHIO: Dearbourne Co.: A. R. Moldenke 1245 (Rf). Fairfield Co.: A. R. Moldenke 1237 (Rf). Highland Co.: A. R. Moldenke 1241 (Ac). Lawrence Co.: A. R. Moldenke 1251 (Rf). Pickaway Co.: A. R. Moldenke 1239 (Rf). Ross Co.: A. R. Moldenke 1240 (Rf). Tuscarawas Co.: A. R. Moldenke 1236 (Ac). KANSAS: Morris Co.: H. N. Moldenke 23152 (Rf). Wabaunsee Co.: A. R. Moldenke 1289 (Rf), 1311 (Ac). MOUNTED ILLUSTRATIONS: A.

R. Moldenke Kod. 9c (Z).

VERBENA URTICIFOLIA var. LEIOCARPA Perry & Fernald

Additional bibliography: Moldenke, Phytologia 11: 411--420. 1965; R. B. Clarkson, Castanea 31: 100. 1966.

Additional citations: OHIO: Bartholomew Co.: A. R. Moldenke 1249 (Rf). Decatur Co.: A. R. Moldenke 1247 (Rf). Franklin Co.: A. R. Moldenke 1246 (Ac). Jackson Co.: A. R. Moldenke 1250 (Ac). ILLINOIS: Calhoun Co.: A. R. Moldenke 1273 (Rf). Clay Co.: A. R. Moldenke 1253 (Rf). Fayette Co.: A. R. Moldenke 1262 (Ac). Greene Co.: A. R. Moldenke 1270 (Ac). Macoupin Co.: A. R. Moldenke 1267 (Ac). Marion Co.: A. R. Moldenke 1260 (Ac).

xVERBENA VAGA Moldenke

Additional bibliography: Moldenke, Phytologia 13: 275. 1966; Moldenke, Résumé Suppl. 14: 10. 1966.

VERBENA VALERIANOIDES H.B.K.

Additional bibliography: Bocq., Adansonia 3: [Rev. Verbenac.] 203. 1863; Moldenke, Phytologia 13: 275. 1966.

VERBENA WEBERBAUERI Hayek

Additional & emended bibliography: Moldenke, Phytologia 10: 148 & 297 (1964) and 13: 275. 1966.

The Hammarlund specimens cited below were incorrectly cited by me in 1964 as V. parvula Hayek.

Additional citations: BOLIVIA: La Paz: Hammarlund 167 (N), 196 (N).

VERBENA WRIGHTII A. Gray

Additional bibliography: Moldenke, Phytologia 13: 276. 1966; Moldenke, Résumé Suppl. 14: 1. 1966.

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ADDITIONAL NOTES ON THE GENUS AVICENNIA. I

Harold N. Moldenke

AVICENNIA L.

Additional synonymy: Arvicennia Beebe, Zoologia 1: 59, sphalm. 1909. Avacinea Braungart & Arnett, Introd. Pl. Biol. 321, fig. 268, sphalm. 1962. Avicinnia P. Beauv. ex Espirito Santo, Junt. Invest. Ultramar Est. Ens. & Docum. 104: 27, sphalm. 1963. Aviceinnia P. Beauv. ex Espirito Santo, Junt. Invest. Ultramar Est. Ens. & Docum. 104: 74, sphalm. 1963.

Additional & emended bibliography: P. Browne, Civil & Nat. Hist. Jamaic., ed. 2, 263 & Index 1: 12 (1789) and 2: 7. 1789; A. L. Juss.,

Gen. Pl., ed. 1, 108 (1789) and ed. 2, 121. 1791; Raf., Atl. Journ. 1: 148. 1832; F. Krauss, Flora 28: 68. 1845; W. Griff., Trans. Linn. Soc. Lond. 20: 1—7, pl. 1, fig. 1—14. 1846; A. Rich., Tent. Fl. Abyss. 2: 173. 1851; Seem., Bot. Herald 65 & 66. 1852; N. J. Anderss., Galap. Veg. 201. 1854; N. J. Anderss., Vet. Akad. Handl. Stockh. 1853: 201. 1855; Hassk., Retzia 1: 17 & 246. 1855; Bocq., Adansonia 2: 91—92. 1862; Turcz., Bull. Soc. Nat. Mosc. 36 (2): 226. 1863; Bocq., Rev. Verbenac. 91—92, 178, 179, & 181. 1863; Beddome, Fl. Sylv. Anal. Gen. 174, pl. 22. 1872; Scheffer, Ann. Jard. Bot. Buitenz. 1: 44. 1876; A. Gray, Syn. Fl. N. Am. 2 (1): 334 & 340—341. 1878; Treub, Ann. Jard. Bot. Buitenz. 3: 79—88, pl. 14 & 15. 1883; Lefroy, Bull. U. S. Nat. Mus. 25: 97. 1884; Schenck, Flora 72 [new ser. 44]: [83]--88, pl. 3, fig. 1—6. 1889; Kuntze, Rev. Gen. Pl. 2: 502 & 986. 1891; Warb. in Engl., Bot. Jahrb. 13: 426—427. 1891; W. A. Talbot, Syst. List Trees Shrubs Bomb., ed. 1, 159, 163, & 214. 1894; Just, Bot. Jahresber. 23 (1): 134 & 506 (1897) and 23 (2): 135 & 506. 1897; J. Ramírez, Veg. Méx. 110. 1899; Brenner, Bericht. Feutsch. Bot. Gesell. 20: 175—189, pl. 6—8. 1902; Schimper, Pl. Geogr., ed. Croom & Balfour, 400, 403, 406, & 826. 1903; E. D. Merr., Philip. Journ. Sci. Bot. 1, Suppl. 1: 122. 1906; Beebe, Zoologia 1: 59. 1909; Kawakami, List Pl. Formos. 83. 1910; A. Stewart, Proc. Calif. Acad. Sci., ser. 4, 1: 131—132. 1911; W. A. Talbot, Forest Fl. Bombay 2: 361—363. 1911; Dunn & Tutcher, Kew Bull. Misc. Inf. Addit. Ser. 10: 201 & 205. 1912; J. Matsumura, Ind. Pl. Jap. 2 (2): 528. 1912; Liebau, Beitr. Anat. & Morphol. Mangrove 2, 4, 10—13, 15, 16, 18, 19, 26, 29, & 33. 1913; J. H. Holland, Kew Bull. Misc. Inf. Addit. Ser. 9 [Useful Pl. Nigeria]: 527. 1915; R. T. Baker, Journ. & Proc. Roy. Soc. N. S. Wales 49: 257—281. 1916; Unwin, W. Afr. Forest. 397. 1920; H. N. Ridl., Journ. Fed. Malay States Mus. 10: 150—152. 1920; Bakh., Bull. Jard. Bot. Buitenz., ser. 3, 3: 199—226, [V], & VI, pl. 14—22. 1921; Bakh. in Lam & Bakh., Bull. Jard. Bot. Buitenz., ser. 3, 3: 2, 102—104, & [106]. 1921; Sprague & Riley, Kew Bull. Misc. Inf. 1924: 3—5. 1924; Gamble, Fl. Madras 1086 & 1105—1106. 1924; P. C. Standl., Contrib. U. S. Nat. Herb. 23: 1235 & 1251. 1924; Cheeseman, Man. N. Zeal. Fl., ed. 2, 764—765. 1925; Den Berger, Handel. 4e Ned. Ind. Naturwet. Congr. Batavia 1926, 397 & 404. 1927; S. Sasaki, List Pl. Formos. 349. 1928; Schnarf in Linsb., Handb. Pflanzenanat. 10 (2): 233 & 380. 1929; F. R. Irvine, Pl. Gold Coast xlviii, lxvi, lxxix, & 44, fig. 17. 1930; A. Chev., Rev. Bot. Appl. 1931: 1000. 1931; Hutchinson & Dalz., Fl. W. Trop. Afr., ed. 1, 2 (1): 268 & 270. 1931; C. E. C. Fischer, Kew Bull. Misc. Inf. 1932: 295. 1932; Dop & Capdefosse, Cong. Soc. Sav. Toulouse. 1933; Kanehira, Fl. Micron. 456. 1933; Paterm., Beitr. Zytol. Verbenac. 30. 1935; Jovet, Bull. Soc. Bot. France 82: 218—219. 1935; Hutchinson & Dalz., Fl. W. Trop. Afr., ed. 1, 2 (2): 613. 1936; Dalz., Useful Pl. W. Trop. Afr. 453. 1937; Sampaio, Bol. Mus. Nac. Rio Jan. 13: 256 & 282. 1937; Fletcher, Kew Bull. Misc. Inf. 1938: 409 & 443—444. 1938; Anon., Kew Bull. Misc. Inf. 1938: index 27. 1938; Robledo, Lecc. Bot. 2: 499. 1940; Lam & Meeuse in Holthuis & Lam, Blumea 5: 235. 1945; Le Cointe, Amaz.

Bras. III Arv. & Pl. Uteis, ed. 2, 149--150 & 498. 1947; E. D. Merr., Ind. Raf. 204. 1949; De Sousa, Anais Jun. Inv. Col. 3: 52. 1949; W. A. Talbot, Syst. List Trees Shrubs Bomb., ed. 3, 407--408. 1949; J. Leonard, Nat. Belges Bull. Mens. 34 (3): 53--65. 1953; E. L. Little, U. S. Dept. Agr. Forest Serv. Agric. Handb. 41: 62 & 450. 1953; Symoens, Biol. Abstr. 27: 2768. 1953; Aristeguieta, Clave & Descrip. Fam. Arb. Venez. 192, 193, 246, & 279. 1954; Berhaut, Fl. Sénegal 113 & 115. 1954; Van Steenis, Proc. Sympos. Humid Trop. Veg. 216. 1958; Puri, Proc. Sympos. Humid Trop. Veg. 21. 1958; Wyatt-Smith & Kwan, Proc. Sympos. Humid Trop. Veg. [24]. 1958; F. R. Fosberg, Proc. Sympos. Humid Trop. Veg. 46. 1958; Van Steenis, Fl. Males., ser. 1, 54: 431--445. 1958; Aubrév., Fl. For. Cot. IV. 3: 234, pl. 338. 1959; Reitz, Sellowia 11: 74 & 89. 1959; J. Hutchinson, Fam. Flow. Pl., ed. 2, 2: 395. 1959; Anon., Kew Bull. Gen. Index 1929-1956, 27. 1959; Angely, Liv. Gen. Bot. Bras. 13, 35, & 39. 1960; Soukup, Biota 5: 131. 1960; A. Castellanos & al., Fl. Restinga 22. 1960; Angely, Fl. Paran. 15: 2 & 17. 1960; E. C. G. Gray, Sympos. Impact Man Humid Trop. Veg. 351. 1960; Moldenke, Biol. Abstr. 35: 2177 & 3688 (1960) and 36: 719. 1961; Stearn, Cat. Bot. Books Coll. Hunt 2: xciv. 1961; Anon., Assoc. Etud. Tax. Fl. Afr. Trop, Index 1960: 60. 1961; F. R. Irvine, Woody Pl. Ghana 750, fig. 140. 1961; Rumner, Rep. G. W. Groff Coll. 362. 1961; Padmanabhan, Curr. Sci. India 30: 425--426. 1961; Khan, Pakist. Journ. Forest. 11: 43--45. 1961; Padmanabhan, Journ. Madras Univ. 32B: 13--19. 1962; Padmanabhan, Curr. Sci. India 31: 434. 1962; Cuf., Bull. Jard. Bot. Brux. 32: Suppl. 803. 1962; Liu, Illustr. Nat. & Introd. Lign. Pl. Taiwan 2: 1201, pl. 1009. 1962; Angely, Fl. Bacia Paran. 22: 28. 1962; Van Steenis, Proc. Nederl. Akad. Wetens., ser. C, 65: 165--167. 1962; Anon., Assoc. Etud. Tax. Fl. Afr. Trop. Index 1961: 60. 1962; Moldenke, Biol. Abstr. 37: 1062. 1962; Hocking, Excerpt. Bot. A.5: 45--46. 1962; Pesman, Meet Fl. Mex. 165--166. 1962; Braungart & Arnett, Introd. Pl. Biol. 321, fig. 268. 1962; Anon., Biol. Abstr. 38: 1203. 1962; Soukup, Biota 4 (31): 112 (1962) and 4: 297. 1963; D. B. Ward, Castanea 28: 174. 1963; Malaviya, Proc. Indian Acad. Sci., ser. B, 58: 45--50 & 351, fig. 1--20. 1963; Siddiqui & Aziz, Planta Med. 11: 458--464. 1963; Sidhu, Ind. For. 89: 337--351. 1963; Espirito Santo, Junt. Invest. Ultramar Est. Ens. & Docum. 104: 27, 29, 31, 35, 41, 54, 56, 61, 64, & 74. 1963; Shelford, Ecol. N. Am. 72, 480, 481, 549, & 578, fig. 19-4. 1963; Compère, Taxon 12: 150--152. 1963; Miranda & Hernández Xolocotzi, Bot. Soc. Bot. Mex. 28: 42, 64, & 110, pl. 38. 1963; H. P. Riley, Fam. Flow. Pl. S. Afr. 128. 1963; Legris, Trav. Sect. Scient. Inst. Franç. Pond. 6: 322, 323, 325, 439, 547, & 556. 1963; Li, Woody Fl. Taiwan 816--818, fig. 329. 1963; Anon., Biol. Abstr. 44: B.13. 1963; R. Paris in T. Swain, Chem. Pl. Tax. 345. 1963; Meher-Homji, Trav. Sect. Scient. Inst. Franç. Pond. 7 (1): 164 & 166. 1963; Anon., Assoc. Etud. Tax. Fl. Afr. Trop. Index 1962: 63 (1963) and 1963: 60. 1964; Menninger, Seaside Pl. 13 & 286. 1964; D. E. Ferguson, Biol. Abstr. 45: 4257 & B.13. 1964; Punt, Reg. Veg. 11. 1964; Moldenke in Shreve & Wiggins, Veg. & Fl. Son. Des. 2: 1263. 1964; G. Kunkel, Veget. Act. Geobot. 12: 97. 1964; Corner, Life of Pl. 26 & 162, pl. 36a. 1964;

Angely, Bibl. Veg. Paran. 143 & 195. 1964; Langman, Select. Guide Lit. Flow. Pl. Mex. 79, 105, 369, 451, 664, & 1010. 1964; B. Singh, Bull. Nat. Bot. Gard. Lucknow 89: 14. 1964; Malaviya, Biol. Abstr. 45: 5670 & 7016 (1964) and 45 (16): B.13. 1964; Van Steenis, Fl. Males. Bull. 19: 1113. 1964; G. Kunkel, Willdenovia 3: 641, 646, & 652. 1964; Anon., N. Y. World Teleg. & Sun R.5, November 17. 1964; A. L. Moldenke, Phytologia 11: 72. 1964; H. & E. Boyko, Trans. N. Y. Acad. Sci., ser. 2, 26: 1091. 1964; Moldenke, Biol. Abstr. 45: 3321. 1964; Moldenke, Résumé Suppl. 11: 5 (1964) and 12: 3, 8, & 9. 1965; Backer & Bakh., Fl. Java 2: 595 & 613. 1965; A. D. Hawkes, Guide Pl. Everglades Nat. Park 41, 43, 45, & 48. 1965; De Naurois & Roux, Bull. Inst. Franç. Afr. Noire 27: 843—857. 1965; A. L. Moldenke, Phytologia 12: 248. 1965; Marg. Nielsen, Introd. Flow. Pl. W. Afr. 17, 51, 53, 162, & 163, fig. 43a. 1965; Liogier, Rhodora 67: 350. 1965; G. Kunkel, Biol. Zentralbl. 84: 642. 1965; G. Kunkel, Ber. Schweiz. Bot. Gesell. 75: 20, 22, 24, 26, 29, 30, 37, & 39, fig. 8, 9, & 14. 1965; F. R. Fosberg, Govt. Sarawak Sympos. Ecolog. Res. Humid Trop. Veg. 272 & 278. 1965; J. Muller, Govt. Sarawak Sympos. Ecolog. Res. Humid Trop. Veg. 148. 1965; Heyligers, Govt. Sarawak Sympos. Ecolog. Res. Humid. Trop. Veg. 253. 1965; Van Steenis, Fl. Males. Bull. 20: 1290. 1965; Moldenke, Phytologia 12: 6 & 30. 1965; Gooding, Loveless, & Proctor, Fl. Barbados 365 & 465. 1965; Giglioli, Ann. Entomol. Soc. Amer. 58: 885, 888, & 890. 1965; Thornton & Giglioli, Journ. Appl. Ecol. 2: 257—261. 1965; Anon., Biol. Abstr. 47 (9): S.15 (1966), 47 (11): S.16 (1966), 47 (17): S.18 (1966), and 47 (18): S.96. 1966; G. Taylor, Ind. Kew. Suppl. 13: 14. 1966; Moldenke, Phytologia 13: 401 & 507. 1966; Anon., Gen. Costa Ric. Phan. 10. 1966; Fournier, Imp. Tree Fam. Costa Ric. 13. 1966; Thornton & Giglioli, Biol. Abstr. 47: 4303. 1966; Macnae, Austral. Journ. Bot. 14: 67—104. 1966; Mathis in T. Swain, Compar. Phytochem. 248 & 267. 1966; Moldenke, Biol. Abstr. 47 (17): S.92. 1966; Anon., Assoc. Etud. Tax. Fl. Afr. Trop. Index 1965: 67. 1966; G. W. Lawson, Pl. Life W. Afr. 58 & 59, fig. 21. 1966.

It is of interest to note that Santapau (1960) enumerates the following plants as typical "mangroves" in the Bombay area of India: Acanthus ilicifolius L., Aegiceras corniculatum Blanco, Bruguiera gymnorhiza Lam., Ceriops tagal C. B. Robinson, Clerodendrum inerme (L.) Gaertn., Excoecaria agallocha L., Kandelia rheedii Wight & Arn., Lumnitzera racemosa Willd., Rhizophora mucronata Lam., Sonneratia acida L., and S. apetala Ham.

Backer & Bakhuizen van den Brink (1965) describe the Javan members of this genus as "Trees of the mangrove and the banks of tidal streams, surrounded by emerged, so-called respiratory roots arising vertically from far-creeping horizontal roots. The fruits of the Jav. species drop unopened; soon afterwards they open by 2 valves. The discharged embryo, which is devoid of a testa, possesses 2 large, unequal, fleshy green, conduplicate cotyledons (large one embracing the smaller one), a robust, basally or entirely hairy hypocotyl and a rather far-developed plumule. It floats for some time on the water-surface; young seedlings often

form large intricate clumps. The undersurface of the leaves, and the young branchlets are densely clothed with grey, white or brownish, short, dense, papilloid hairs; the lower surface of the leaves often bears minute salt-crystals; the upper surface is always studded with numerous sunken glandular dots. The horizontal roots from which the so-called respiratory roots arise lie at slight depth in the muddy soil and may reach a length of several metres; the vertical respirators roots arising from them emerge for a length of 20—50 cm from the mud or from the water; they are of moderate thickness, have a tapering top, or not or very sparingly branched and coated with a thick, easily compressible corky layer bearing many lenticels. It is not yet quite sure that they really play a part in the respiration." These same authors also note that these trees are "Sometimes planted between and along coastal fish-ponds. The wood is of very inferior quality, and is almost exclusively used for fuel. This tree is often spared in localities where producers of better wood are continually felled; consequently in the course of time there may locally arise an almost pure Avicennia forest. Such forests are in Java always anthropogenous; they constitute a climax-form of selective devastation of litoral forests coupled with spontaneous regeneration, and are found only in inhabited regions."

Corner (1964) says "A seed must lodge somewhere for some time in order that the young plant within may emerge and root. Such lodgements cannot be made on the rocks in the moving water of seaweed life, though sea grasses and mangrove trees bring their seed heritage from land and establish a new order of seed sea plants on muddy and sandy flats.....On muddy tropical coasts, and their muddy estuaries or lagoons, there develops directly the mangrove forest with its gloomy character. About the limits of the tropics, mangrove trees peter out. The colder air and water of winter, seem to stop them. They cannot withstand frost and they have no subtropical or temperate counterpart. In extratropical waters therefore their place is taken by the characteristic saltmarsh herbs, as the sea lavenders, sea asters, sea chenopods (beets, Salicornia, Obione, Sueda) and the seagrasses."

Of interest to students of history is the report by Siddiqui & Aziz (1963) that a recently discovered manuscript of Abu ben Sina (ca. A.D. 1010) discusses no less than 64 cardiac drugs known to him, with their mode of action. Both physiologic and psychologic principles of therapy are discussed by him.

It should be noted here that the A. St.-Hil., Mém. Mus. Nat. Hist. Paris 4: 387—394 (1818) reference in the bibliography of this genus is sometimes incorrectly cited as "3: 381—394". Similarly, the Hutchinson & Dalz., Fl. W. Trop. Afr. reference is sometimes incorrectly cited as "2: 270 & 613. 1927".

H. P. Riley (1963) reports that the sporophytic chromosome number in this genus is ca. 33. Aristeguieta (1954) records the following vernacular names as applied to this genus as a whole, but he is probably referring only to the local A. germinans: "mangle", "mangle amarillo", "mangle negro", "mangle prieto", and "mangle

salado". Nielsen (1965) says "Genus may be placed in a separate family Avicenniaceae because of unilocular ovary and free central placenta".

The R. M. King 1550, distributed as Avicennia, is actually Laguncularia racemosa (L.) Gaertn. f.

AVICENNIA AFRICANA P. Beauv.

Additional synonymy: Avicinnia africana P. Beauv. ex Espirito Santo, Junt. Invest. Ultramar Est. Ens. & Docum. 104: 27, sphalm. 1963. Aviceinnia africana P. Beauv. ex Espirito Santo, Junt. Invest. Ultramar Est. Ens. & Docum. 104: 74, sphalm. 1963. Avicennia africana Jacq. ex G. Kunkel, Willdenovia 3: 652. 1964.

Additional & emended bibliography: Just, Bot. Jahresber. 23 (2): 135 & 506. 1897; A. Chev., Rev. Bot. Appl. 1931: 1000. 1931; J. H. Holland, Kew Bull. Addit. Ser. 9 [Useful Pl. Nigeria 3]: 527. 1915; Unwin, W. Afr. Forest. 397. 1920; F. R. Irvine, Pl. Gold Coast xlviii, lxvi, & 44, fig. 17. 1930; Hutchinson & Dalz., Fl. W. Trop. Afr., ed. 1, 2 (1): 270 & 631, fig. 271 (1931) and 2 (2): 613. 1936; Dalz., Useful Pl. W. Trop. Afr. 453. 1937; De Sousa, Anais Jun. Inv. Col. 3: 52. 1949; Berhaut, Fl. Sénegal 113 & 115. 1954; Aubrév., Fl. For. Cot. Iv. 3: 234, pl. 338. 1959; Moldenke, Biol. Abstr. 35: 2177 (1960) and 36: 719. 1961; F. R. Irvine, Woody Pl. Ghana 750, fig. 140. 1961; Espirito Santo, Junt. Invest. Ultramar Est. Ens. & Docum. 104: 27, 29, 31, 35, 41, 54, 56, 61, & 64. 1963; Compère, Taxon 12: 150--152. 1963; Hepper in Hutchinson & Dalz., Fl. W. Trop. Afr., ed. 2, 2: 448 & 449, fig. 309. 1963; G. Kunkel, Willdenovia 3: 652. 1964; Moldenke, Résumé Suppl. 11: 5. 1964; Giglioli, Ann. Entomol. Soc. Amer. 58: 885, 888, & 890. 1965; Marg. Nielsen, Introd. Flow. Pl. W. Afr. 17, 51, 53, 162, & 163, fig. 43a. 1965; G. Kunkel, Ber. Schweiz. Bot. Gesell. 75: 20, 22, 24, 26, 29, 30, 37 & 39, fig. 8, 9, & 14. 1965; Thornton & Giglioli, Journ. Appl. Ecol. 2: 257--269. 1965; G. W. Lawson, Pl. Life W. Afr. 58 & 59, fig. 21. 1966.

Additional illustrations: F. R. Irvine, Pl. Gold Coast fig. 17. 1930; Hutchinson & Dalz., Fl. W. Trop. Afr., ed. 1, 2 (1): fig. 271. 1931; Aubrév. Fl. For. Cot. Iv. 3: pl. 338. 1959; F. R. Irvine, Woody Pl. Ghana fig. 140. 1961; Hepper in Hutchinson & Dalz., F. W. Trop. Afr., ed. 2, 2: fig. 309. 1963; G. Kunkel, Ber. Schweiz. Bot. Gesell. 75: fig. 8, 9, & 14. 1965; Giglioli, Ann. Entomol. Soc. Amer. 58: 885--891. 1965; Marg. Nielsen, Introd. Flow. Pl. W. Afr. fig. 43a. 1965; G. W. Lawson, Pl. Life W. Afr. fig. 21. 1966.

Giglioli (1965) reports that the females of the mosquito, Anopheles melas, lay their eggs after dark in the first half of the night on damp mud under Avicennia trees during neaptides. Thornton & Giglioli (1965) report that the highest concentrations of water-soluble sulfate and free sulphur were found in Gambia under Avicennia where this tree appeared as a secondary colonizer. Additional vernacular names reported for this species are "bùle", "bulé", "cabêco", "cabêso", "cabaca", "djibicum", "ió", "iófo",

"pebadije", "petá", "pule", "púle", "tarafe", "tarafé", and "úle". The name "tarafe" is applied also to Laguncularia and Rhizophora. The Hutchinson & Dalziel reference cited above is sometimes misdated "1927".

Hepper (1963) records the species as flowering in July, and fruiting in January, February, April, July, and August. He cites the following specimens, doubtless from the Kew herbarium: MAURITANIA: Döllinger 73, in part. SENEGAL: Döllinger 73, in part; Baldwin 5753; Chevalier 2759 & 2760; Leprieur s.n. GAMBIA: Fox 106; Pitt 693; Frith 34; Ruxton s.n.. PORTUGUESE GUINEA: Esp. Santo 1219 & 1766. GUINEA: Debeaux s.n. SIERRA LEONE: Deighton 2362; Don 168; Glanville 246; T. S. Jones 410; Lane-Poole 320; Thomas 7070. LIBERIA: Baldwin 13050; Dinklage 1910; T. Vogel 101; Whyte s.n. IVORY COAST: Chevalier 19908. GHANA: Andoh 5604; Chipp 175; DeWit & Morton A.2971; Irvine 754; Johnson 984; Morton A.494. TOGO REPUBLIC: Warnecke 63. SOUTHERN NIGERIA: Barter 46; MacGregor 341; Rosevear 16; Talbot s.n.; Unwin 56. BRITISH CAMEROONS: Maitland 30. FERNANDO PO: Mann 231; Milne s.n. He notes that it "Extends along the coast of western Africa to Cabinda and Congo; also in S. Tome. If this plant is regarded as conspecific with similar ones in America, as does Compere in Taxon 12: 150—152 (1963), the correct name appears to be A. germinans (Linn.) Linn."

Compère (1963) makes the following interesting comments: "I have compared the African material named Avicennia africana P. Beauv. with the American material of A. germinans deposited in the Brussels 'Herbarium du Jardin Botanique de l'Etat'. Though these plants show a wide variability, I am unable to find any constant character separating the African plants from the American ones. According to Moldenke.....A. africana should have mostly narrow and elongate leaf-blades, up to 24 cm. long, and not nigrescent in drying, whereas A. germinans would have shorter and broader leafblades, 4.5—15 cm. long, and nigrescent in drying. I have measured the leaves of all the specimens in Brussels; the African plants have leaves 8—16 cm long and 12 of the 33 specimens are nigrescent on drying, whereas the American ones have leaves 5,5—16 cm long and only 9 of the 22 specimens are nigrescent on drying. Thus, these plants show a close parallel variation on both sides of the Atlantic Ocean and it does not seem possible to separates them at a specific level."

Dalziel (1937) says "The sapwood is white, the heart light brown, darkening, fairly hard and durable, said to be termite-proof. It is used on the coast for boat and house-building, piles, wharves, gunstocks, etc. It yields firewood, and charcoal for fish ovens, and is used in the Niger Delta to prepare salt, chiefly from the leaves and roots; the salt from A. nitida is better than that from other mangroves, etc. The bark yields tannin (12.5 percent) and is suitable for local use in tanning (B. I. I. 1913:417, analysis). It is also said to be used as a red dye. The bark is used to treat

parasitic skin diseases, itch, etc. In Western Senegal some island people are said to use the germinating seeds of Avicennia as a famine food, but these, when uncooked or improperly prepared, are actually poisonous (Ref. — A. Chev. in R. B. A. 1931: 1000)." He lists many vernacular names: "white mangrove" [also given to Laguncularia], "black mangrove", "palétuvier blanc", "sana" [also applied to Rhizophora], "mbougand" [the fruit], "tarrafe", "ufiri", "ĕ-bure", "ka-bure", "garigari", "grigri", "buwe", "nja-wului" [= "waterside tree"], "jaia-guli", "gbĕlĕti", "buĕ", "buĕ-dintĕ", "asukuru", "asokoro", "asopro", "asokpolo", "angma-taho", "mutuku-tsho", "tra-tsho", "amu-tsi" [="lagoon tree"], "amu-ati", "ogbun", "ede", "ehrodo", "afia-nunung", "ata-nunung", "odonumon", and "boandjo". He notes that some of these names are used for any of the various mangrove plants of the region.

Irvine (1961) describes A. africana as follows: "A shrub or tree 60—70 ft. high; 'breathing roots' (pneumatophores) numerous, protruding 1—2 in. from lagoon-side mud, slender 'stilt roots' near trunk base, bark scaly, deciduous, dark red-brown, branchlets puberulous; leaves lanceolate to oblong-lanceolate, rarely narrowly elliptic, shiny above, closely pitted, dull olive-green below, 7 x 3 in., lateral nerves 10—12 pairs, raised on both surfaces, looped and joined near edges, forming intra-marginal nerves; flowers (Apr,, June-July, Oct.) fragrant, bird-pollinated, dull white, thin purplish stripes inside, petals usually 4, flowers crowded on short stalks often as small panicle; fruits (Jan.) 1—2 in. long, green, obliquely ellipsoid, flattened laterally, beaked, tomentellous. The germinating seeds are used in certain western Senegalese islands in famine, and said to be actually poisonous if eaten raw or improperly cooked.....The sapwood is white, the heartwood light brown. It is fairly hard and durable, and is said to resist termites and is useful for housebuilding, furniture (e. g. chair-legs), and boats. It stands well under water and forms excellent fuel and charcoal. The bark yields 12.5 per cent. tannin, is used to tan leather, and is used in S. Leone as a red dye. Salt prepared mainly from the leaves and roots in the Delta region of Nigeria is said to excel that made from other mangroves. The dry pulverized bark in warm water is used as a paste for parasitic skin diseases, itch, and dermatitis. The pulverized bark, with palm-oil, is made into an ointment which is used in Fr. Equat. Africa for itch, lice, and 'flesh worms' (Abbé Walker). The leaves are said to be used as an enema in Liberia for piles." He says that the plant inhabits the mangrove association, is gregarious, and is distributed from "Senegambia to Gaboon and B. Congo". He records the vernacular names "amutsi", "asokplo", "asudur", "asoporo", "asokoro", "anmaatso", "black mangrove", "esukuru", "mutukutɪo", "olive mangrove", and "tratɔo" — "amutsi" meaning "lagoon tree". He cites Chipp 175, Deakin 24, Foggie 4842, Irvine 754, and Johnson 984. In his 1930 work he describes this tree as "One of the tallest trees in lagoon community" and records the vernacular names "adma'tɛo", "asokpolo", and "white mangrove".

According to Nielsen (1965) "it is to be noticed that all the

youngest and most active feeding roots are carried on the underground portions of the breathing roots. Since they are able to grow continually upwards, they can bear more and more new roots as the soil level rises. It is viviparous like the red mangrove. It is seen as a shrub in great numbers near ports or as a tree in less disturbed areas near beaches, creeks or lagoons subject to flooding twice a month, usually on higher ground than Rhizophora. It is known as white mangrove in Africa."

Lawson (1966) calls this plant "white mangrove" also, and comments that "mangroves form a good example of convergent evolution because they have a number of marked characteristics in common even though they consist of a group of plants derived from widely divergent families, such as evergreen leathery leaves, breathing roots, and vivipary. Found in open type lagoons influenced by twice daily flooding."

Additional citations: LIBERIA: Dinklage 1910 (A).

AVICENNIA ALBA Blume

Additional synonymy: Avicennia officinalis var. alba Hook apud Talbot, Forest Fl. Bombay 2: 364, in syn. 1911. Avicennia marina var. alba Bakh. apud Fletcher, Kew Bull. Misc. Inf. 1938: 444. 1938. Avicennia officinalis var. alba C. B. Clarke apud Fletcher, Kew Bull. Misc. Inf. 1938: 444. 1938.

Additional & emended bibliography: Hassk., Retzia 1: 17 & 246. 1855; Scheffer, Ann. Jard. Bot. Buitenz. 1: 44. 1876; Talbot, Forest Fl. Bombay 2: 361, 363, & 364, fig. 457. 1911; H. N. Ridl., Journ. Fed. Malay States Mus. 10: 151. 1920; Bakh. in Bakh. & Lam, Nov. Guinea 14, Bot. 1: 172. 1924; Gamble, Fl. Madras 1105 & 1106. 1924; C. E. C. Fischer, Kew Bull. Misc. Inf. 1932: 295. 1932; Kanehira, Fl. Micron. 456. 1933; Fletcher, Kew Bull. Misc. Inf. 1938: 443—444. 1938; Anon., Kew Bull. Misc. Inf. 1938: index 27. 1938; Anon., Kew Bull. Gen. Index 1929-1956, 27. 1959; E. C. G. Gray, Sympos. Impact Man Humid Trop. Veg. 351. 1960; Santapau, Fl. Bombay & Salsette [3]. 1960; Moldenke, Phytologia 7: 151—158 & 293. 1960; Moldenke, Biol. Abstr. 36: 719. 1961; Legris, Trav. Sect. Scient. Inst. Franç. Pond. 6: 323, 547, & 556. 1963; Moldenke, Dansk Bot. Arkiv 23: 85. 1963; Meher-Homji, Trav. Sect. Scient. Inst. Franç. Pond. 7 (1): 166. 1963; Backer & Bakh., Fl. Java 2: 614. 1965; Moldenke, Résumé Suppl. 12: 8. 1965.

The fig. 457 in Talbot, Forest Fl. Bombay 2: 363 (1911), previously cited by me, as well as by other authors, as A. alba, and so labeled by Talbot, is actually a representation of A. marina (Forsk.) Vierh.

The leaves on Elmer 21250 are exceptionally broad. Material of A. alba has been misidentified and distributed in herbaria under the name A. alba Wight, which is a synonym of A. marina (Forsk.) Vierh. The A. alba of Karsten is A. eucalyptifolia Zipp., as is also A. alba var. acuminatissima Merr. On the other hand, the Purseglove P.5098, distributed as A. alba, is actually var. latifolia Moldenke, Hoogland 4699 is A. eucalyptifolia Zipp., and Elmer

11990 is in part A. alba and in part A. eucalyptifolia.

The natural distribution of A. alba seems to be from India and Burma, through Indochina and Thailand to Malaya, the Philippines, Caroline Islands, Riouw Archipelago, Sumatra, Java, Borneo, Celebes, Lesser Sunda Islands, the Moluccas, New Guinea, Bismark Archipelago, Solomon Islands, and northern Australia. Fischer (1932) cites Tahir s.n. [Herb. Forest Dept. 1232] from British North Borneo.

Additional citations: INDOCHINA: Cochinchina: Pierre s.n. [Baria, 12.1865] (Ca—38881). WESTERN PACIFIC ISLANDS: PHILIPPINE ISLANDS: Island undetermined: Herb. Philip. Forest Bur. s.n. (Bi). INDONESIA: GREATER SUNDA ISLANDS: British North Borneo: Elmer 21250 (Vi). Java: Hochreutiner 2776 (Ca—41253). Kambangan: Collector indig. s.n. [12-6-09] (Bi). Sumatra: Yates 1110 (Mi). MELANESIA: NEW GUINEA: Papua: Brass 28889 (W—2409563); Hoogland 4184 (W—2213809). BISMARK ARCHIPELAGO: New Britain: Dissing 2692 (Ac, Cp).

AVICENNIA ALBA var. LATIFOLIA Moldenke

Additional bibliography: Moldenke, Phytologia 7: 158—159. 1960.

Purseglove describes this plant as a tree to 40 feet tall, with peg-like breathing roots, the corollas deep-yellow, and the fruit gray-green tomentose, growing in pure stands along tidal creeks, flowering and fruiting in May. He identified it as A. alba Blume.

Additional citations: INDONESIA: GREATER SUNDA ISLANDS: Sarawak: Purseglove P.5098 (N).

AVICENNIA BICOLOR Standl.

Additional bibliography: Moldenke, Phytologia 7: 160—161. 1960.

Additional citations: PANAMA: Darien: Duke 5488 (Z). PEARL ISLANDS: San José: I. M. Johnston 1259 (Rf).

AVICENNIA EUCALYPTIFOLIA Zipp.

Additional bibliography: Moldenke, Phytologia 7: 162—165. 1960; G. Taylor, Ind. Kew. Suppl. 13: 14. 1966.

Additional vernacular names recorded for this species are "kabubu" and "utukap". Material has been misidentified and distributed in herbaria under the name A. tomentosa Jacq.

Additional citations: WESTERN PACIFIC ISLANDS: PHILIPPINE ISLANDS: Mindanao: Elmer 11990, in part (Bi). MELANESIA: SOLOMON ISLANDS: Malaita: Kajewski 2344, in part (Bi). NEW GUINEA: Papua: Hoogland 4699 (Bi, W—2213989); J. C. Saunders 138 (W—2213494). AUSTRALIAN REGION: AUSTRALIA: Western Australia: Kaspiew 23 (S).

AVICENNIA GERMINANS (L.) L.

Additional & emended synonymy: Avicennia germinans (L.) P. Browne,

Civil & Nat. Hist. Jamaic., ed. 2, index 1: [12] (1789) and 2: [7]. 1789. Avicennia floridana Raf., Atl. Journ. 1: 148. 1832. Arvicennia nitida Beebe, Zoologia 1: 59, sphalm. 1909. Avicennia germinalis (L.) Stearn apud Soukup, Biota 5: 131, sphalm. 1960. Avicennia nitida (Alter.) Sessé & Moq. ex Legris, Trav. Sect. Scient. Inst. Franç. Pond. 6: 556. 1963.

Additional & emended bibliography: L., Sp. Pl., ed. 1, 1: 110 (1753) and ed. 3, 2: 891. 1764; P. Browne, Civil & Nat. Hist. Jamaic., ed. 2, 263, index 1: [12] (1789) and 2: [7]. 1789; Willd. in L., Sp. Pl., ed. 4, 3: 394—395. 1800; Benth., Bot. Voy. Sulphur 155. 1846; Seem., Bot. Herald 65 & 66. 1852; N. J. Anderss., Galap. Veg. 201. 1854; N. J. Anderss., Vet. Akad. Handl. Stockh. 1853: 201. 1855; J. Torr., Bot. Mex. Bound. 128. 1858; Turcz., Bull. Soc. Nat. Mosc. 36 (2): 226. 1863; A. Gray, Syn. Fl. N. Am. 2 (1): 341. 1878; Lefroy, Bull. U. S. Nat. Mus. 25: 97. 1884; Schenck, Flora 72: [83]—88, pl. 3, fig. 1—6. 1889; Just, Bot. Jahresber. 23 (2): 135 & 506. 1897; J. Ramírez, Veg. Méx. 110. 1899; Brenner, Ber. Deutsch. Bot. Gesell. 20: 175—189, pl. 6—8. 1902; Altamirano, An. Inst. Méd. Nac. Méx. 5: 54—60. 1903; Schimper, Pl.-Geogr., ed. Croom & Balfour, 406. 1903; Beebe, Zoologia 1: 59. 1909; A. Stewart, Proc. Calif. Acad. Sci., ser. 4, 1: 131—132. 1911; Liebau, Beitr. Anat. & Morphol. Mangrove 4. 1913; P. C. Standl., Contrib. U. S. Nat. Herb. 23: 1251. 1924; Sprague & Riley, Kew Bull. Misc. Inf. 1924: 3—5. 1924; F. R. Irvine, Pl. Gold Coast xlviii, lxvi, & 44. 1930; Hutchinson & Dalz., Fl. W. Trop. Afr., ed. 1, 2 (1): 270, fig. 271. 1931; Dalz., Useful Pl. W. Trop. Afr. 453. 1937; Sampaio, Bol. Mus. Nac. Rio Jan. 13: 256 & 282. 1937; Robledo, Lecc. Bot. 2: 499. 1940; H. Pittier, Cat. Escog. Geogr. Fis. & Prehis. Costa Rica 26. 1942; LeCointe, Amaz. Bras. III. Arv. & Pl. Uteis, ed. 2, 149—150. 1947; E. D. Merr., Ind. Raf. 204. 1949; E. L. Little, U. S. Dept. Agr. Forest Serv. Agric. Handb. 41: 62. 1953; Hocking, Dict. Terms Pharmacog. 135. 1955; H. Hildebrand, Ciencia 17 (7-9): 151—173. 1958; J. F. Macbr., Field Mus. Publ. Bot., ser. 13, 5: 721. 1960; Soukup, Biota 5: 131. 1960; Moldenke, Phytologia 7: 165—168 & 179—206. 1960; Moldenke, Biol. Abstr. 35: 2177 & 3688. 1960; Hocking, Excerpt. Bot. A.5: 45. 1960; Angely, Fl. Paran. 16: 38 (1960) and 17: 15. 1961; F. R. Irvine, Woody Pl. Ghana 750. 1961; E. L. Little, Phytologia 8: 49—57. 1961; Soukup, Biota 4: 112. 1962; Liu, Illustr. Nat. & Introd. Lign. Pl. Taiwan 2: 1201, pl. 1009. 1962; Moldenke, Biol. Abstr. 37: 1062. 1962; Pesman, Meet Fl. Mex. 165—166. 1962; Hocking, Excerpt. Bot. A.5: 45. 1962; Braungart & Arnett, Introd. Pl. Biol. 321, fig. 268. 1962; Compère, Taxon 12: 150—152. 1963; Legris, Trav. Sect. Scient. Inst. Franç. Pond. 6: 322, 323, 547, & 556. 1963; Miranda & Hernández Xolocotzi, Bol. Soc. Bot. Mex. 28: 42, 55, 64, & 110, pl. 38. 1963; Shelford, Ecol. N. Am. 72, 480, 481, 549, & 578, fig. 19-4. 1963; D. B. Ward, Castanea 28: 174. 1963; Langman, Select. Guide Lit. Flow. Pl. Mex. 79, 369, 451, & 1010. 1964; Menninger, Seaside Pl. 13. 1964; Anon., N. Y. World Teleg. & Sun R.5, November 17. 1964; Punt, Reg. Veg. 36: 11. 1964; Moldenke in Shreve & Wiggins, Veg. & Pl. Son. Des. 2:

1263—1264. 1964; Little & Wadsworth, U. S. Dept. Agr. Handb. 249: 12 & 476—478, pl. 225. 1964; A. L. Moldenke, Phytologia 11: 72 (1964) and 12: 248. 1965; A. D. Hawkes, Guide Pl. Everglades Nat. Park 41, 43, 45, & 48. 1965; Scholander, Science 148: 1488. 1965; Liogier, Rhodora 67: 350. 1965; Scholander, Hammel, Bradstreet, & Hemmingsen, Science 148: 339, fig. 3. 1965; Kunkel, Bericht. Schweiz. Bot. Gesell. 75: 24. 1965; Gooding, Loveless, & Proctor, Fl. Barbados 365 & 465. 1965; Moldenke, Résumé Suppl. 12: 1 & 3. 1965; Thornton & Giglioli, Journ. Appl. Ecol. 2: 257, 261—264, & 267—269. 1965; G. Taylor, Ind. Kew. Suppl. 13: 14. 1966; Fournier, Imp. Tree Fam. Costa Ric. 13: 1966; G. W. Lawson, Pl. Life W. Afr. 58 & 59. 1966.

Additional illustrations: Schenck, Flora 72: pl. 3, fig. 1—6. 1889; Brenner, Ber. Deutsch. Bot. Gesell. 20: pl. 6—8. 1902; Pesman, Meet Fl. Mex. 165. 1962; Braungart & Arnett, Introd. Pl. Biol. fig. 268. 1962; Miranda & Hernandez Xolocotzi, Bol. Soc. Bot. Mex. 28: 110, pl. 38. 1963; Shelford, Ecol. N. Am. 481, fig. 19-4. 1963; Little & Wadsworth, U. S. Dept. Agr. Handb. 249: pl. 225. 1964; A. D. Hawkes, Guide Pl. Everglades Nat. Park 41. 1965; Scholander, Hammel, Bradstreet, & Hemmingsen, Science 148: 339, fig. 3 [second from left]. 1965.

Recent collectors describe this plant a shrubby, to 10 feet tall, a shrub, 2 m. tall, or a tree, to 25 m. tall; trunk to 50 cm. in diameter at breast height; pneumatophores present; leaves succulent; calyx green or greenish; stamens white above, with a yellow base; anthers dark-brown; pistil light-green.

The flowers are described as "white" on Crosby & Anderson 1192, Irwin 542, Turner 2143, and Yuncker 17136 & 18159; "white with yellow tube" on Harling 4966; "white above with yellow base" on Crosby, Hespenheide, & Anderson 803; and "creamy-white with yellow center" on Carter 2721. Irwin 542 has leaves which are much like those normally seen on A. africana P. Beauv. In fact, it is not at all beyond the realm of possibility that the long-leaved specimens found sporadically in the New World are actually the African species. I have never been fully satisfied that they are conspecific with typical A. germinans material. The fig. 271 in Hutchinson & Dalziel (1931), labeled "Avicennia nitida", is actually an illustration of typical A. africana.

Avicennia germinans inhabits seashores, saline shores and flats, tidal bays, and rocky beaches, from sea-level to 25 m. altitude. Recent collectors have found it in anthesis in February, May, July, and October. King calls it "not common in flat open grazed areas behind beach, in sandy soil, the vegetation mainly thorny leguminous shrubs" in Oaxaca, while Wiggins found it growing "along muddy strand with Rhizophora mangle" in Baja California, Hernandez Xolocotzi & Segalen encountered it "with Rhizophora, Laguncularia, Spartina, and Acrostichum" in Tabasco, and Carter describes it as "abundant on low dunes" in Baja California, Mexico. Irwin found it "in wet alluvial clay immediately above

hightide zone" in British Guiana. Box tells us that in Antigua it is found in "all coastal associations, often forming large mangrove swamps on mud flats, frequent to abundant around the coast"; Yuncker encountered it at the edge of mangrove swamps and associated with Rhizophora in Jamaica. On this same island Crosby, Hespenheide, & Anderson describe it as "common at edge of mangrove swamps", while Crosby & Anderson call it "common on rocky beach". In Pasco County, Florida, it was found by Ray, Lakela, & Patman "in sandy marl, open grassy area with cabbage palmetto and scrub oak", while on Mustang Island, Texas, it is "locally abundant" according to Jones.

On Indefatigable Island, according to Taylor, "this is the less frequent of the mangroves, which are almost all Rhizophora. This forms tall trees (40--50 ft.) which show up above the shrub vegetation of the adjacent dry belt.....the wood of this trees is said to be very bad for firewood."

In Shreve & Wiggins (1964) the general distribution of this species is given as "Mangrove lagoons, from southern Florida and southeastern Texas, Bermuda, the Bahamas, and both coasts of Mexico, through the West Indies to the coasts of Brazil and Peru; also on the Galapagos and other islands off the coasts of tropical and subtropical America. In our area [Sonoran Desert] from the vicinity of Mulegé, Magdalena Bay, and Guaymas south along the coast."

Little & Wadsworth (1964), in their work on the flora of Puerto Rico and the Virgin Islands, say "The virgin forests along the shores of protected bays, lagoons, and estuaries were dense stands of mangrove, the trees of only 4 species growing to a height of 60 feet or more. Five public forests bordering the coast still contain mangroves. In the water itself is Mangle colorado (Rhizophora). On the adjacent area normally subject to tidal flooding are Mangle blanco (Laguncularia) and Mangle negro (Avicennia). On the landward side is Mangle botón (Conocarpus)." The discussion of our plant by these authors is so excellent that it is well worth repeating here:

"This is 1 of the 4 kinds of mangrove trees which form swamp forests at sea level in salt water and brackish water along silty seashores. Mangle prieto is distinguished by: (1) opposite lance-shaped or narrowly elliptic leathery leaves 2--4 1/2 inches long and 1/2--1 3/4 inches broad, the upper surface yellow green and often shiny, the lower surface gray green with a coat of fine hairs giving a grayish color to the crown, and both surfaces often with scattered salt crystals and salty to the taste; (2) clusters of several crowded stalkless white 4-lobed flowers about 1/4 inch long and 3/8 inch across; (3) elliptic flattened blunt-pointed seed capsules 1 -- 1 1/4 inches long and about 3/4 inch wide, yellow-green and finely hairy, often splitting open into 2 parts; and (4) bright orange to yellow inner bark.

"Commonly a small tree or shrub 10--40 feet high and attaining a trunk diameter of 1 foot in Puerto Rico, evergreen with rounded crown of spreading branches. Bark is smooth and dark gray or brown

on small trunks but becomes dark brown, fissured and scaly, and thick. The inner bark, brown, deeper within, has a slight salty taste. Twigs are gray or brown, finely hairy when young, with enlarged and ringed joints or nodes.

"Often numerous fleshy pencillike projections (pneumatophores) rise vertically from the long horizontal roots in the mud under a tree, perhaps aiding in bringing air to the roots. Masses of roots 1/2 to 1 1/2 feet long sometimes hang in the air from the upper part of large trunks.

"The short petioles are 1/8 -- 1/2 inch long. Blades are short-pointed or blunt at apex, short-pointed at base, and not toothed on edges.

"Flower clusters (spikes or panicles) are terminal and lateral, erect on 4-angled stalks 1/2 — 1 1/2 inches long, and bear several finely hairy flowers. The gray-green calyx is cup-shaped, 3/16 inch long, deeply 5-lobed, with 3 smaller scales (bracts) outside; the corolla tube about the same length has 4 slightly unequal spreading rounded or notched lobes, white but yellowish at base; 4 stamens 3/16 inch long are inserted on corolla tube near base; and the pistil 3/16 inch long has a 1-celled ovary, slender style, and 2-lobed stigma.

"The fleshy seed capsule contains 1 large dark green seed which is an embryo plant without seedcoat. Often the seed germinates on the tree, splitting open the fruit. Upon falling, the young plant continues growth in the mud or may float and be transported by tide and currents. Flowering and fruiting nearly throughout the year.

"The sapwood is light brown and thick. The heartwood is dark brown or blackish. The wood is very hard, very heavy (specific gravity 0.9), and strong. It has a coarse, uneven, interlocked grain and prominent growth rings and is very susceptible to attack by dry-wood termites.

"Seldom sawed into lumber, the wood is used primarily for posts in Puerto Rico. Timbers of larger size have been employed elsewhere for various purposes, such as piers, wharves, and other marine construction, as well as for telegraph and power poles and crossties. The wood is used also for fuel and charcoal, and the bark for tanning.

"This is an important honey plant of coastal areas, producing clear white honey of high quality. The flowers are rich in nectar and attract bees. It is reported that the sprouting seeds are edible when cooked but poisonous raw. Salt for cooking or eating purposes can be obtained from the salt-coated foliage.

"This species seems more hardy than the other 3 kinds of mangroves, to which it is not related. It penetrates farther inland along rivers and in the United States ranges farther northward, beyond the tropical zone. In Puerto Rico it appears to withstand prolonged flooding better than white-mangrove (Laguncularia racemosa). The advancing thickets of mangroves with networks of roots collect and hold silt, thus building up the shores.

"In mangrove forests in brackish water near protected silty

shores and at mouths of rivers around Puerto Rico, usually with other species of mangrove but rarely forming pure stands. Also Culebra, Vieques, St. Croix, St. Thomas, St. John, and Tortola.

"Public forests. -- Aguirre, Boquerón, Ceiba, Guánica, and San Juan.

"Range. -- Very widely distributed along tropical silty seashores of Bermuda and throughout West Indies (except Dominica) from Bahamas and Cuba to Trinidad and Tobago and Bonaire and Curaçao. Coasts of Florida from northern part to Florida Keys, Mississippi, Louisiana, and Texas in southeastern United States and both coasts of Mexico south along Central America to Ecuador, northwestern Peru, and Galapagos Islands and to Brazil. Also west coast of Africa.

"Other common names. -- mangle negro, mangle bobo, siete cueros, salado (Puerto Rico); mangle prieto, mangle negro, mangle blanco (Spahish); black-mangrove, manglecito (commerce); puyeque (Mexico); palo de sal (Central America); istatén, árbol de sal (El Salvador); culumate, mangle salado (Costa Rica); mangle salado, white-mangrove (Panama); iguanero (Colombia); mangle salado, mangle rosado, mangle prieto (Venezuela); mangle iguanero (Ecuador); black-mangrove, honey-mangrove, saltbush (United States); black-mangrove (English); blackwood-bush (Bahamas); limewood (Trinidad); courida, cruda (British Guiana); manglier noir, palétuvier (Haiti); palétuvier blanc, mangle blanc, chêne Guadeloupe, palétuvier (Guadeloupe); palétuvier blanc, manglier noir (French Guiana); mangel blancu, saltpond-tree (Dutch West Indies); parwa (Surinam); siriuba, seriba (Brazil)."

Additional vernacular names recorded by collectors are "mangle amarillo", "mangle cenizo", "mangle gris", "mangle pardo", "mangle senico", "mangue amarelo", and "palétuvier branco". Sampaio (1937) records "mangue", "mangue cereibuma", "mangue cereitinga", "seriba", and "seriúba", but notes that the first of these is applied also to Laguncularia and to Rhizophora.

Carter describes Avicennia germinans as abundant on low dunes on "sand dune peninsula extending into a bay" and says that the flowers are "creamy white and a yellow center". Carter & Ferris found it growing along with Allenrolfea, Salicornia, and Batis on low saline flats, with Laguncularia as an associate and Suaeda farther inland. Le Cointe (1947) says "Predomina nos mangais de Marajó e na parte setentrional do litoral paraense", the wood "Pardo-escuro; para construção civil, formentes. D = 0,95. -- O lenho e otimo combustivel. Ind. -- A casca é rica em tanino. -- Dá boa pasta para papel de impressão (43,7 % de celulose)."; in medicine "Adstringente poderoso, anti-hemorrágico, anti-diarréico"; Beebe (1909) reports that its leaves are eaten by the haotzin (Opisthocomus hoazin).

Pesman (1962) tells us that in Mexico "Strangely enough it is called both white and black (mangle blanco and mangle prieto or negro). It does not have stilt roots but sends out vertical rootlets above the water to breathe. Seeds, as in Rhizophora, may sprout while on the tree. On falling they are kept afloat until finding a

likely place to grow, along the shoreline.....The tree is often lopped for firewood, reducing it to low shrubs." It grows to 75 feet tall. Ward (1963) records it from Cedar Key and Seashore Key, Levy County, Florida; Bonet says "Introducida de Isla Pájaros (Campeche) en 1948".

Sprague & Riley (1924) state that mangrove swamps cover the low coast line of British Honduras and numerous cays or coral islands, giving a densely wooded appearance -- the principal trees being red, white, and black mangroves. Rovirosa, in La Naturaleza, reproduced by Ramirez (1899), refers to Avicennia on the seacoast of Tabasco; Seeman (1852) mentions it with Rhizophora and Acrostichum aureum as the principal elements in the littoral flora of Panama. Schimper (1903) states that the mangrove formation of west Africa and of the American coasts consists of 4 species: Rhizophora mangle (on the outer edge), Laguncularia racemosa (on the inner boundary), and Avicennia nitida & A. tomentosa (in the intermediate position).

Little (1961) presents very fully the arguments in favor of the legal conservation of the name A. nitida for this species. Stearn (1958) presents the arguments for the rejection of this binomial and its replacement by A. germinans (L.) Stearn. Punt (1964) accepts the name, A. germinans (L.) P. Browne, as the proper one for this taxon, but Compère (1963) maintains A. germinans (L.) L. as the proper form. His paper is of such importance that it may be well to reproduce it here:

"For a long time this plant was called Avicennia nitida Jacq., but, in 1958, Stearn.....made for it the new combination Avicennia germinans (L.) Stearn, based on the older Bontia germinans L. Recently, E. L. Little.....showed that the name Avicennia germinans had been published already by Linnaeus in 1764 and by P. Browne in 1789, which obviously anticipates Stearn's combination. In his paper, Little gives a very complete account of the literature on the nomenclature of this species and concludes that Avicennia nitida Jacq. remains the correct name. His conclusion is based on the assumption that A. germinans L. was a new name, superfluous when published, and not a new combination based on Bontia germinans L. It is this assumption that I wish to discuss here.

"Linnaeus first published the name Bontia germinans in his Systema Naturae ed. 10: 1122. 1759. His description is very short: "A. B. fol. oppositis, pedunculis spicatis. Brown. jam. 263. Loefl. hisp. 193."

"The lectotype of this species, proposed by Stearn and later accepted by Little (Phytologia 8: 49. 1961) and Moldenke (Phytologia 7: 183. 1960) is a specimen from Browne in the Linnaean Herbarium, no. 813, 2, which was first described by P. Browne (Civ. Nat. Hist. Jam.: 263. 1756) to whom Linnaeus refers by means of the citation Brown. jam. 263.

"In the second edition of his Species Plantarum 2: 891. 1763, Linnaeus took up Bontia germinans again, but he expanded its circum-

scription to include the Avicennia officinalis of the first edition 1:110. 1753; here it is described in this way:

"'BONTIA foliis oppositis pedunculis spicatis.
Bontia foliis subtus tomentosis. Jacq. amer. 25.
Bontia foliis integris oblongis oppositis, petiolis crassis brevissimis subamplexantibus, floribus racemosis. Brown. jam. 263
Mangle laurocerasi foliis, flore albo tetrapetalo. Sloan. jam. 156. hist. 2. p. 66. Raj. dendr. 115.
Avicennia. Fl. zeyl. 57. Mat. med. 42. Sp. pl. I. p. 110.
Anacardium. Bauh. pin. 511.
Oepata. Rheed. mal. 4. p. 95. t. 45.
Habitat in Indiis.
Reduxi hanc speciem ex sententia D. Jacquini autoptiae.'

"One year later, in the third edition of Linnaeus' Species Plantarum 2: 891. 1764, this species was transferred from Bontia to the genus Avicennia as A. germinans; here the account is almost the same as in the preceding edition:

"'AVICENNIA foliis subtus tomentosis. Jacq. americ. 25. t. 112. f. 2.
Avicennia. Fl. Zeyl. 57. Mat. med. 42. Sp. pl. 1. p. 110.
Bontia foliis integris oblongis oppositis, petiolis crassis brevissimis subamplexantibus, floribus racemosis. Brown. jam. 263.
Mangle laurocerasi foliis, flore albo tetrapetalo. Sloan. jam. 156. hist. 2. p. 66. Raj. dendr. 115.
Anacardium. Bauh. pin. 511.
Oepata. Rheed. mal. 4. p. 95. t. 45.
Habitat in Indiis. ♄
Reduxi hanc speciem ex sententia D. Jacquini autoptae.'

"As said above, the descriptions in the second and third edition of the Species Plantarum are almost identical, the first sentence of the second edition only being omitted in the third as inappropriate, because Bontia had been restricted to B. daphnoides. Thus, it is evident that the editor of the third edition, almost certainly Jacquin, when publishing Avicennia germinans in 1764 had in mind the plant Linnaeus had called Bontia germinans in 1763. Therefore, we must consider Avicennia germinans (L.) L. 1764' as a new combination based on Bontia germinans L. 1763, though there is no direct reference to the former work in the latter. ['Mr. Ross kindly informed me that the third edition of the Species Plantarum was published at Vienna, probably at the instigation of Jacquin, and probably without Linnaeus having any part in its production. The corrections made in the third edition (reestablishment of the genus Avicennia with the two species recognized by Jacquin and characterized by Jacquin's own diagnostic sentences, completion of the citations from Jacquin's works) strongly suggest Jacquin's intervention, but as long as we have no direct evidence of it, it seems better to attribute the combination A. germinans to Linnaeus as the whole work is attributed to him.] The question to be settled

now is to know whether Bontia germinans L. 1763 can be regarded, as Little does, as a new name, different from Bontia germinans L. 1759. In 1763, Linnaeus did not explicitly refer to his Systema Naturae ed. 10, but his description began with a sentence which repeated textually the 1759 diagnosis, and, in the synonymy, he referred to Brown. jam. 263. where the type of the 1759 species was described. Both these elements make a strong indirect reference to the previous description, and it is clear that Bontia germinans L. 1763 is nomenclaturally the same as Bontia germinans L. 1759; it is typified by the same specimen, i.e., the Browne specimen in the Linnaean Herbarium 813, 2. In 1763, when including in his Bontia germinans the earlier Avicennia officinalis, Linnaeus was not correct according to the present rules of the botanical nomenclature, as he ought to have kept the older epithet., i.e. officinalis; but, as B. germinans was not a new name, article 7, 4 of the Montreal Code has no application here and B. germinans must keep its initial type. Thus, Avicennia germinans (L.) L. 1764 must be treated as a new combination with Bontia germinans L. 1759 as basionym. This combination, when published, was superfluous as including the older, validly published Avicennia officinalis L.; nevertheless, it is not illegitimate since article 63 (note) of the Montreal Code reads: 'A nomenclaturally superfluous new combination is not illegitimate if the epithet of the basionym is legitimate. When published it is incorrect but it may become correct later.' Incorrect when published, Avicennia germinans (L.) L. becomes correct when restricted to the American plant described as Bontia germinans in 1759. The binomial A. germinans was first correctly used in this restricted sense in the second edition of P. Browne's Civil and Natural History of Jamaica, 1789."

Material of A. germinans has been misidentified and distributed in herbaria as A. officinalis L., Conocarpus erecta L., and Laguncularia sp. On the other hand, the F. Shreve s.n. [Herb. Umbach 25666], distributed as this species, is actually Laguncularia racemosa (L.) Gaertn. f. Hahn 654 is a mixture with A. schaueriana Stapf & Leechman.

Additional citations: FLORIDA: Dade Co.: Totten & Gifford s.n. [December 26, 1940] (Hi—22672). Levy Co.: Godfrey & Redfearn 52828 (Hi—142519). Pasco Co.: Ray, Lakela, & Patman 9980 (Hi—201871). Pinellas Co.: R. F. Thorne 9489 (Ca—905241). Saint Johns Co.: Ward & West 1343 (Hi—181984). Anastasia Island: Ward & Ward 2311 (Hi—183520). Big Coppitt Key: F. H. Sargent 6541 (St). Big Pine Key: Brizicky & Stern 181 [wood no. Y-51034] (B); Killip 32899 (Mi), 40946 (Au—120836); Muenscher & Thorne 18073 (Ca—770902). Jug Island: R. K. Godfrey 55942a (Hi—139123). Largo Key: Russell & Totten s.n. [Dec. 28, 1940] (Hi—20906a, Hi—21834, Hi—218344, Hi—21906). Longboat Key: N. A. Reasoner s.n.

[Dec. 27, 1915] (Hi—59489). Merritt's Island: Kral 4972 (Ca—95424). LOUISIANA: Jefferson Par.: Reese 4075 (Hi—187011). TEXAS: Cameron Co.: Lundell & Lundell 8760 (Ca—7342); Tharp, Gimbrede, & Johnson 52-525 (St). Nueces Co.: F. B. Jones 2257 (Fj); Tharp s.n. [Port Aransas, 7/2/39] (Ca—882435). Mustang Island: F. B. Jones 5610 (Fj). Padre Island: Correll, Lundell, & Johnston 25539 (Ld). MEXICO: Baja California: A. Carter 2721 (Ca—916211, Ld); Diguet s.n. [environs de La Paz, 1913] (Mi); Guzman Huerta H.84 (Ip); F. Shreve 6516 (Mi), 7099 (Mi); I. L. Wiggins 5455 (Ca—660825, Mi, Rf), 11487 (Ca—758693, Gg—401258), 16174 (Mi); Wiggins & Wiggins 18239 (Mi). Campeche: Sauer 2406 (Ws). Jalisco: J. Rzedowski 14605 (Ip). Michoacán: B. L. Turner 2143 (Mi). Oaxaca: F. H. Elmore D.21a (Mi), D.22 (Ca—945981, Mi); R. M. King 1549 (Au—183170, N, W—2301510). Sinaloa: Breedlove 1577 (Mi); Mercado 11 (Ip). Sonora: W. S. Phillips 3483 (Gg-371586), 3486 (St, St); I. L. Wiggins 6341 (Mi). Tabasco: Hernández Xolocotzi & Segalen 245 (Ip); Sauer & Gade 3144 (Mi). Tamaulipas: Edw. Palmer 484 (Gg—456646); Sauer & Gade 2911 (Mi). Vera Cruz: J. Rzedowski 14797 (Ip, Mi); Sánchez R. s.n. [17.V.1963] (Ip). Yucatán: G. F. Gaumer 635, in part [Herb. Umbach 15479] (Ws). MUJERES ISLAND: Sauer & Gade 3265 (Mi). CARMEN ISLAND: Carter & Ferris 3733 (Ca—199587); R. V. Moran 3926 (Ca—1726). TRES MARIAS ISLANDS: Maria Magdalena: F. H. Elmore IB2 (Mi). PÉREZ ISLAND: Bonet M.21 (Ip). HONDURAS: Choluteca: Paray 562 (Ip). EL SALVADOR: La Union: Beetle 26263 (Ca—648848). COSTA RICA: Guanacaste: F. H. Elmore E.1 (Ca—946054, Mi). Puntarenas: Lems 5026 (N). PANAMA: Canal Zone: Stern, Chambers, Dwyer, & Ebinger 50 (Bm). BERMUDA ISLANDS: Main: W. R. Taylor 49-1055 (Mi). BAHAMA ISLANDS: Easter: Howard & Howard 10205 (Ca—926206). CUBA: Camaguey: Shafer 1124 (Bi). Havana: Ekman 456 (Mi). JAMAICA: Crosby & Anderson 1192 (Mi); Crosby, Hespenheide, & Anderson 803 (Mi); Harris & Lawrence C.152 (Ca—984463), C.159 (Ca—984464); Sauer 1828 (Ws); Webster, Ellis, & Miller 8237 (Mi, S); Yuncker 17136 (Mi), 18159 (Mi). HISPANIOLA: Dominican Republic: B. Augusto 1603 (N). Haïti: Holdridge 1064 (Mi); Sauer 1936 (Ws). PUERTO RICO: Otero M.77 (Mi). LEEWARD ISLANDS: Five Islands: Box 1356 (Mi). Guadeloupe: Stehlé 1587 (Mi). WINDWARD ISLANDS: Grenada: R. A. Howard 10955 (N). Martinique: Hahn 654, in part (Ca-232488); Stehlé & Stehlé 5143 (W—2453678), 6163 (W—2453695). CURAÇAO: Arnoldo 2063 (W—2110330). MARGARITA ISLAND: Gines 3332 (W—2174527), 3347 (W—2174541). COLOMBIA: Atlántico: Dugand & Jaramillo 4178 (W—1900171); Elias 1156 (W—1594975), 1494 (Mi); Feddema 2038 (Mi). Magdalena: H. H. Smith 420 (Hi—196908, Mi), 1937 (Ca—95792, Hi—196909, Mi). VENEZUELA: Anzoategui: F. D.

Smith 206 (W--2121447), 207 (W--2121448); Tamayo 2070 (W--1857790). Delta Amacuro: Gines 5131 (W--2167912).

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BOOK REVIEWS

Alma L. Moldenke

"The Plant Cover of Sweden" edited by Societas Phytogeographica in "Acta Phytographica Suecica" : 50, x & 316 pp., illus. Uppsala University Press. 1965.

This excellent study is dedicated to G. Einar du Rietz on his 70th birthday -- April 25, 1965 -- by his pupils in the traditional "Uppsala School of Phytosociology". And how considerate these authors were to produce such a work while their colleague and mentor was still alive!

The papers covered a symposium on the general features of Swedish vegetation. Du Rietz himself would have been the most acceptable author for work on the littoral lichen communities.

The Regional Survey covered features of land and climate. Aspects of the South covered vertical zonation of littoral algae in Bohuslän, coastal algae off Göteborg, salt marsh vegetation, growth on rocks, woods on Jungfrun Isle, etc. Aspects of the North covered mires and calcareous fens in Jämland, Lappland, major rivers, etc. Past and present covered changes from late Quaternary, effect of 600,000 reindeer, etc.

The print, the illustrations and the paper are all of good quality.

"Plant Diversification" by Theodore Delevoryas, VII & 145 pp., illus. Holt, Rinehart & Winston Press, Inc., New York, N. Y. 10017. 1966. $2.25 (paper back).

"Plant Diversification", along with the other books in this Modern Biology Series, provides an integration of the general and the comparative, the cellular and the organismic, the structural and the functional phases of dynamic biology.

It is well organized, clearly illustrated, and effectively presented plant histology found in almost any good botany text. When used with the other topical texts in this series, it proves itself of considerable value.

The author emphasizes that double fertilization is the critical characteristic of angiosperms, and that wind pollination of these plants is a derived, not primitive condition, on the basis of vascular bundle traces.

"Cartilaginous" is misspelled on page 102.

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NEW TAXA OF SOUTH AMERICAN COMPOSITAE

In-Cho Chung, Illinois Teachers College: Chicago - South

Bidens triplinervis H.B.K. var. macrantha (Wedd.) Sherff form. exaristata Chung, form. nov.

Achaenia exaristata.

Ecuador: Prov. Pichincha, El Pisque, cerca de Guayllabama, 1800 m. Acosta S. 16278 (typus F).

Chrysanthellum weberbaueri Chung, sp. nov.

This resembles C. mexicanum Greenm. in habit and in the foliage but differs from it and from C. americanum (L.) Vatke in broadly cartilaginous-margined disk achenes and in the subcompressed more or less tuberculate ray achenes.

Herba annua glabra, caule gracili recto ramoso striato 15-20 cm. alto. Folia alterna petiolata tripinnatisecta, laciniis linearibus acutis. Inflorescentia corymbosa. Capitula pedunculata turbinata anthesi 5 mm. lata 3.5 mm. alta; squamae involucri extimae 2 lineari-lanceolatae uninerviae, interiores ca. 8 membranaceae multinerviae margine scariosae ovatae obtusaeque ca. 3 mm. longae 1-1.5 mm. latae; paleae receptaculi lineari-lanceolatae acutiusculae ca. 2 mm. longae membranaceae 3-nerviae margine scariosae. Flosculi radiales feminei ca. 13, corolla 1.5 mm. longa, tubo 0.5 mm. longo glanduloso, ligula ovata 1 mm. longa 2-nervia integerrima vel retusa; flosculi discales hermaphroditi ca. 23, corolla tubuliformi ca. 1.5 mm. longa 4(5)-loba; staminibus 4(5) inclusis, antheris ca. 0.5 mm. longis vix sagittatis; rami stylorum lineares ca. 0.8 mm. longi basi glaber exceptus dense pubescentes. Achaenia radiales subcompressa 3-3.5 mm. longa apice ca. 2 mm. lata basi 1-1.5 mm. lata margine cartilaginea tuberculataque; achaenia discales plana cuneato-obovata ca. 3.5 mm. longa 2-2.5 mm. lata alis inclusis, ala cartilaginea 0.7-0.9 mm. lata margine integerrima ciliataque apice brevissime protrusa.

Peru, Weberbauer 6465 (typus F 629085).

Dasyphyllum barbatum Chung, sp. nov.

This may be easily distinguished from all other species of Dasyphyllum by its villous filaments inserted at the apex of the corolla tube and by the glabrous inner surface of the corolla.

Frutex 1.5-2 m. altus, ramulis fuscis striatis dense pubescentibus, foliis solitariis vel fasculatis obovatis vel ellipticis vel rotundis 2.5-5 cm. longis 1.5-2.5 cm. latis apice mucronatis basi attenuatis vel rotundatis brevipetiolatis integerrimis penninerviis subtus inter nervos laterales

reticulato-venosis utrinque pubescentibus, aculeis axillaribus geminis rectis 1-2.5 cm. longis basi ca. 1 mm. crassis pubescentibus. Capitula sessilia plerumque solitaria. Involucra turbinata 2.7-3.2 cm. longa, squamis 7-11-seriatis, exterioribus coriaceis ovatis vel ovato-lanceolatis mucronatis dense ciliatis utrinque cinereo-tementosis, interioribus chartaceis rectis lineari-lanceolatis utrinque cinereo-tomentosis; receptaculo plano ca. 7 mm. diam. dense villoso; axis solidus. Flosculi 28-45 hermaphroditi, corolla atropurpurea 17-23 mm. longa bilabiata intus glabra, tubo 5-7 mm. longo glabro, ligula exteriori apice 4-loba, lobis 2-3 mm. longis extus dense villosis, ligula interiori 10-16 mm. longa basi ca. 0.7 mm. lata apice extus dense villosa; stamina 5, filamentis liberis ca. 5 cm. longis densissime villosis summo tubo insertis; antheris ca. 5 mm. longis, caude 1 mm. longa, appendice 1.5-2 mm. longa emarginata vel integerrima; pappi setis 23-26 uniserialis plumosis 15-17 mm. longis basi connatis; achaeniis 6-8 mm. longis dense cinereo-villosis cylindraceis.

Peru: Lima, cultivated at the Botanical Garden, Seibert 2096 (typus US 1901491), Martinet s.n. (P); Prov. Lambayeque: west side Abra Porculla Pass km. 35 east of Olmos, Mesones-Muro Highway between Olmos and Rio Maranon, alt. 1650 m., Hutchison 1379 (F); inter Bagua et Olmos, Maekawa 602307 (F, TH).

The pollen grains are, unlike the typical form of Dasyphyllum, ellipsoidal and of the Mutisia type.

Ericentrodea corazonensis (Hieron.) Blake & Sherff var. cuatrecasasii (Sherff) Chung, comb. nov.

Bidens rubifolia H.B.K. var. Cuatrecasasii Sherff, Botanical Leaflets no. 3: 8. 1951.

This differs from E. corazonensis (Hieron). Blake & Sherff in the longer internodes, longer petioles, 5-12-serrate leaf margins, and longer limbs of the disk corollas.

Herba perennis vel suffrutex scandens, caule et ramis oppositis tetragonis vel subteretibus striatis glabris, internodiis 6-15 cm. longis, foliis oppositis, petiolatis 2-5.5 cm. longis, foliolis utrinque 5-12 serratis subcoriaceis penninerviis inter nervos laterales reticulato-venosis. Inflorescentia apice ramorum cymoso-paniculata 8-12 capitulis, pedunculis usque ad 9 cm. longis puberulis bracteis involucri squamis exterioribus similibus praeditis; involuccri campanulati, squamis biseriatis, exterioribus 5 oblongo-lanceolatis acutis 4-5 mm. longis 1.2-2 mm. latis herbaceis 3-nerviis margine diaphanis glandulose-denticulatisque dorso puberulis demum subcoriaceis, interioribus ovato-lanceolatis obtusis 7-8 mm. longis ca. 3 mm. latis scariosis multi-nerviis; paleae receptaculi convexi oblongo-lanceolatae acutae ca. 8 mm. longae 1.5-2 mm. latae scariosae.

Flosculi radiales feminei 6-7 fertiles, ligula oblonga-ovata 17-19 mm. longa 4-5 mm. lata apice 2(-3)-denticulata, tubo ca. 1.5 mm. longo; flosculi discales ca. 33 hermaphroditi, corolla tubulosa glabra 6-7 mm. longa, tubo 1.5-2 mm. longo, limbo 4.5-5 mm. longo laciniis triangularis 0.5-1 mm. longis; antheris exsertis ca. 3 mm. longis appendiculis inclusis; achaenia plana cuneato-obovata ca. 5 mm. longa 2.5-3 mm. lata alis inclusis margine ciliate apice consticta, aristis basi crassis glabrisque ex annulo coronuliformi nascentibus 2-4-fidis, ramis ca. 2 mm. longis retrorsum barbellatis pratensis facile deciduis.

Columbia: Dept. Valle: Hoya del rio Bugalagrande: Barragan, Quebrada de la Chorrera, 3000-3080 m., J. Cuatrecassas 20982 (typus F); Dept. Cauca: entre Purace y el volcan, matorrales en Chiquin, 3100-2700 m., J. Cuatrecasas et E.P.A. 5944 (F).

Ecuador: Prov. Bolivar: Simiatug, Hacienda Talahua, 3200 m., C. W. Penland et R. H. Summers 555(F).

Liabum acostae Chung, sp. nov.

Herba annua (?); caule gracili, atropurpureo, striato, pilis fuscis articulatis dense obsitis; foliis oppositis, laminis membranaceis, hastato-triangularibus, acuiminatis grosse dentatis, 2-3.5 cm. longis, basi 1-3 cm. latis, in petiolum alatum usque ad 1.5 cm. longum, basi auriculatum angustatis, utrinque pilis fuscis articulatis dense obsitis; inflorescentiis corymbosis, oligocephalis, longe pedunculatis, pedunculis usque 9 cm. longis dense pilosis; involucri hemispherici 6 mm. altis, squamis ca. 22, triseriatis, subequilongis, exterioribus ovato-lanceolatis, acuminatis, 5-nerviis, dense pilosis; interioribus angustioribus oblongo-lanceolatis, acuminatis, 3-nerviis, prope apicem pilosis; floribus radii femineis ca. 20, corollis ca. 17 mm. longis luteis, ligula 15.5 mm. longa, 2 mm. lata, elongato-oblonga apice subintegra, tubo 1.5 mm. longo, sparce piloso; floribus hermaphroditis disci ca. 25, corollis ca. 6 mm. longis, tubo 2.5 mm. longo, dense piloso, limbo cylindrico, apice profunde quinquefido, laciniis 2 mm. longis, prope apicem sparse piloso; antheris atropurpureis, ca. 2 mm. longis; achaeniis subturbinatis, 10-striato-angulatis, angulis parce hirtis, 2 mm. longis, fuscis; pappo lutescente, e squamulis 6 ca. 0.7 mm. longis ellipticis apice lacerato-denticulatis et setis todidem 3-3.5 mm. longis scabridiusculis omnibus basi connatis formato; receptaculo plano, ca. 2 mm. diam. favoso-squamuloso.

Ecuador: Entre Oya Cachi y Comenia, Cord. Oriental, Prov. Pichincha, M. Acosta Solis 11175 (F. typus).

Monactis penlandii Chung, sp. nov.

Frutex; ramis atropurpureis subangulato-sulcatis, pubescentibus; foliis alternis, petiolatis; petiolis 1-2 cm. longis, dense pubescentibus; laminis 5-15 cm. longis 2.5-7 cm. latis, e basi cuneatis subrohmbeo-ovatis, acuminatis, margine remote glanduloso-denticulatis, coriaceis, triplinerviis, supra viridibus hirto-scabridis rugosis, subtus subcano-viridibus dense pubescentibus et cum glandulis resinosis sessilibus ornatis; foliis inflorescentiis proximis decrescentibus, bracteiformibus, subsessilibus, ovato-lanceolatis vel lanceolatis; inflorescentiis apice ramulorum dense corymbosis; capitulis numerosis, saepe pluribus dense congregatis, subsessilibus; involucri subcylindracei ca. 6 mm. alti; phyllariis 8-9, biseriatis, herbaceis, 3-5 nerviis, exterioribus minoribus lanceolatis, interioribus oblongis, obtusis, dorso glabris vel pubescentibus, margine ciliatis; receptacult plani, parvi; paleis paucis, oblongis, 7-8 mm. longis obtusis, dorso glandulopubescentibus, flores involventibus, 5-7 nerviis; floribus omnibus hermaphroditis tubulosis 7-8; corollis luteis, ca. 4 mm. longis, tubo limbum aequante, glandulo-pubescentibus vel glabris; limbo campanulato, profunde usque ad medium quinquefido, cum glandulis resinosis sessilibus ornatis; laciniis lanceolatis, acutis, revolutis; achaeniis atropurpureis, ca. 5 mm. longis, subfusiformibus, breviter rostratis et stipitatis, 3-4-angulatis, glabris; pappi squama 1, membranacea, atropurpurea, lanceolata, acuminata, corollae, tubum aequante.

Ecuador: Prov. Azuay: Banos near Cuenca, 2600 m., C. W. Penland 1068 (typus F); Prov. Canar: near Ruins of Ingapirca, 3100 m., C. W. Penland 1030 (F).

Piqueria (Phalacraea) setifera Chung, sp. nov.

Herbacea annua pilosa erecta 9-19 cm. alta; caule gracili simplici atropurpureo striato, internodiis 3-4 cm. longis; foliis oppositis graciliter petiolatis, petiolis 1-3 mm. longis, laminis ca. 10 mm. longis 7 mm. latis, ovato-lanceolatis apice obtusis basi cuneatis margine undulatis; capitulis laxe corymboso-paniculatis, graciliter pedicellatis, 10-12-floris; phyllariis biseriatis ca. 8 spatulatis vel obovato-oblongis vel obovato-lanceolatis 2.5-2.8 mm. longis margine ciliatis; corollis albis 1.5-1.7 mm. longis sparse glandulosis, tubo proprio ca. 0.5 mm. longo, faucibus campanulatis; achaeniis 5-angulatis ca. 1.2 mm. longis glabris basi subrectis, setis brevibus coronatis; setis 15-18, ca. 0.5 mm. longis, basi connatis, barbellatis; receptaculi plani.

Peru: Dept. Cuzco: Prov. Urubamba: Machupicchu, 2040 m., C. Vargas C. 3369 (typus F)

Piqueria (Phalacraea) vargasii Chung, sp. nov.

Herba decumbens ramosa, caule et ramis teretibus viridis puberulo-glandulosis, foliis alternis petiolatis, laminis ovatis basi cuneatis remote serrato-dentatis puberulo-glandulosis. Inflorescentia paniculata, pedicelis gracilis piloso-glandulosis 7-20 mm. longis, capitulis (12-) 15 (-16)-floris, involucri squamis 5-8 subuniseriatis membranaceis ca. 3 mm. longis reticulato-nervosis apice obtusis vel erosis, exterioribus ca. 5 late ovatis virellis subcarinatis dorso margineque puberulo-glandulosis, interioribus 0-3 obovato-cuneatis planis subhyalinis dorso glabris, achaeniis glabris quinquecostatis disco annulari coronatis basi obliquis.

Peru: Dept. Apurimac, Prov. Grau, C. Vargas 6018 (typus F).

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NOTES ON NEW AND NOTEWORTHY PLANTS. XLVI

Harold N. Moldenke

LANTANA INVOLUCRATA f. RUBELLA Moldenke, f. nov.

Haec forma a forma typica speciei corollis rubellis recedit.

This form differs from the typical form of the species in having its corollas uniformly pink throughout the period of anthesis.

The type of the form was collected by Grady Linder Webster & K. I. Miller (no. 9834) in shrubby woods behind the beach at Buccoo Bay, on Tobago Island, August 22, 1959, and is deposited in the herbarium of the Naturhistoriska Riksmuseum at Stockholm.

LANTANA PEDUNCULARIS var. MACROPHYLLA Moldenke, var. nov.

Haec varietas a forma typica speciei laminis foliorum usque ad 7 cm. longis 4 cm. latis densissime ubique velutinis recedit.

This variety differs from the typical form of the species in having its leaf-blades to 7 cm. long and 4 cm. wide when mature, distinctly ovate in shape, and very densely velutinous on both surfaces.

The type of the variety was collected by R. G. Taylor (no. G. 110) at an altitude of 50 feet on Tower Island, Galapagos Islands, on April 3, 1939, and is deposited in the herbarium of the California Academy of Sciences at San Francisco. The collector describes the plant as a small bush, 2--3 feet tall, with white flowers, and notes that it is one of the dominant plants of the island.

LIPPIA BOLIVIANA var. ANGUSTA Moldenke, var. nov.

Haec varietas a forma typica speciei laminis foliorum valde arguteque serratis et ad apicem acute attenuatis recedit.

This variety differs from the typical form of the species in

having its leaf-blades regularly attenuate-acute at the apex and conspicuously sharp-serrate with antrorse teeth on the margins, and the inflorescences very sparse at the tips of the branches.

The type of the variety was collected by Roy F. Steinbach (no. 191) in dry rocky soil at the foot of San Pedro hill, at an altitude of 2575 meters, Cercado, Cochabamba, Bolivia, on May 12, 1966, and is deposited in the herbarium of the Naturhistoriska Riksmuseum at Stockholm.

SERENOA REPENS f. GLAUCA Moldenke, f. nov.

Haec forma a forma typica speciei laminis foliorum distincte glaucis recedit.

This form differs from the typical form of the species in having its leaf-blades distinctly and more or less permanently glaucous.

The type of the form was collected by myself (no. 24161) in dry sandy woodland of pines at Lantana, Palm Beach County, Florida, on December 30, 1966, and is deposited in the herbarium of Aarhus Universitet at Aarhus, Denmark. This form is found chiefly along the eastern coast of Florida and in the scrub association, usually in purestand colonies, often adjacent to the normal form, which is also in separate distinct colonies.

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ADDITIONAL NOTES ON THE GENUS AVICENNIA. II

Harold N. Moldenke

AVICENNIA L.

Additional bibliography: Dastur, Useful Pl. India 38. 1952; Asprey & Robbins, Ecol. Monog. 23: 375, 376, 378, 391, 403, & 411. 1953; Beard, Ecol. Monog. 23: 177. 1953; McLuckie & McKee, Austral. & N. Z. Bot., pr. 5, 88, 144, 459, 460, 658, 659, 662, & 700, fig. 31. 1962; D. B. Ward, Castanea 28: 174. 1963; H. D. Jordan, Journ. Appl. Ecol. 1: 209—212. 1964; Mani, Bull. Bot. Surv. India 7: 114. 1965; Hueck, Wald. Südam. 16 & 116. 1966; J. S. Beard, Descrip. Cat. W. Austr. Pl. 91. 1966; Moldenke, Phytologia 14: 301—320. 1967; Anon., Biol. Abstr. 48 (1): S.19 & S.205. 1967; H. D. Jordan, Biol. Abstr. 48: 383. 1967; Fichter, Frontiers 31 (3): 70—73. 1967.

Beard (1953) mentions that mangroves cover the littoral zone of tidal mud flats and sea lands in French Guiana.

AVICENNIA AFRICANA P. Beauv.

Additional bibliography: Moldenke, Phytologia 14: 306—309 & 312. 1967.

AVICENNIA GERMINANS (L.) L.

Additional bibliography: Asprey & Robbins, Ecol. Monog. 23:

375, 376, 378, 391, 403, & 411. 1953; D. B. Ward, Castanea 28: 174. 1963; H. D. Jordan, Journ. Appl. Ecol. 1: 209—212. 1964; H. D. Jordan, Biol. Abstr. 48: 383. 1967; Fichter, Frontiers 31 (3): 70—73. 1967; Moldenke, Phytologia 14: 305, 307, & 310—320. 1967; Anon., Biol. Abstr. 48 (1): S.19 & S.205. 1967.

Ward (1963) tells us that there are entire forests of this tree on Cedar and Seahorse Keys in Levy County, Florida. Fichter (1967) says that the Ten Thousand Islands region of western Florida has "the largest of all mangrove forests in the world." Asprey & Robbins (1953) record the species from Frunkenmans, Gun, Lime, and Southeast Cays, Jamaica, but maintain that it is not found on Morant Cays.

The Janishes describe the leaves as "always moist, dark green on front, gray green on back". Wiggins reports that the bark is light-gray. Hastungs & Turner found the plant growing in association with Rhizophora mangle and Salicornia ambigua in Sonora, while Thomas reports Salicornia, Batis, and Maytenus phyllanthoides as common associates in Baja California. Wiggins found it growing on muddy strand and sandy flats, while Carter encountered it on low dunes. Additional vernacular names reported for it are "mangle pullequi" and "mangle senico" in Baja California.

The corolla is described as "white" on Janish & Janish 447 and I. L. Wiggins 16174, "yellow" on Breedlove 1577, "creamy-white with yellow center" on A. Carter 2721, and "pale-yellow, darkest in the throat" on R. Robertson 31. Wiggins states that the flowers are "very fragrant".

Additional citations: FLORIDA: Big Pine Key: Killip 40946 (Du—354040). Cedar Key: I. L. Wiggins 19342 (Du—564138). Key Largo: Janish & Janish 447 (Du—392607). Packet Key: I. L. Wiggins 20081 (Du—519170). Seahorse Key: Wiggins & Wiggins 19430 (Du—513126). MEXICO: Baja California: A. Carter 2721 (Du—344050); R. V. Moran 7151 (Du—440561); J. H. Thomas 7940 (Du—417492); I. L. Wiggins 11487 (Du—321784), 11563 (Du—437541), 16174 (Du—509697), 17526 (Du—512012); Wiggins & Wiggins 18017 (Du—507537), 18239 (Du—493595). Jalisco: J. Rzedowski 11605 (Du—513559). Oaxaca: F. H. Elmore D.21a (Du—347465). Sinaloa: Breedlove 1577 (Du—497341). Sonora: Hastings & Turner 64-35 (Du—507040); C. H. Lowe 3319 [R. M. Turner 60-40] (Du—560541). Carmen Isl.: R. V. Moran 3926 (Du—363299). San Francisco Isl.: I. L. Wiggins 17765 (Du—561128). San José Isl.: I. L. Wiggins 17672 (Du—512036). COSTA RICA: Guanacaste: F. H. Elmore E.1 (Du—347463). BAHAMA ISLANDS: Great Abaco: R. Robertson 31 (Du—382662). VENEZUELA: Falcón: Gines 4221 (W—2167639); Hueck s.n. [30-6-58] (N). BRITISH GUIANA: Archer 2625 (W—1663250); Irwin 270 (W—2172701), 542 (Au—165481, Au—178000, Mi). ECUADOR: El Oro: Hjerting & Rahn 643 (W—2314802). Esmeraldas: E. L. Little 6363 [U. S. Dept. Agr. Forest Serv. 29224] (W—1859876).

Guayas: Fagerlind & Wibom 114 (Mi); Harling 3075 (S), 4966 (S). GALAPAGOS ISLANDS: Charles: A. Stewart 3267 (Bi). Chatham: D. Snow 221 (Du—564535). Indefatigable: Rorin & Chris 205 (Bi); Schimpff 30 (Gg—212443); A. Stewart 3270 (Bi); T. W. J. Taylor T.T.91 (Gg—461253), T.T.98 (Gg—461276); I. L. Wiggins 18310 (Rf), 18686 (Ac). Seymour: E. W. Elliott s.n. [1945] (W—1564050). PERU: Tumbes: López & Sagástegui 4007 (S). BRAZIL: Ceará: Drouet 442 (Lb—17193), 2442 (W—1594848), 2548 (Lb—17192). Maranhão: Fróes 1818 (Mi). Pará: Black 48-3237 (Ca—73003), 48-3427 (Ca—72920). Rio de Janeiro: Sampaio 8141 (Ja—44854, Ja, Ja, Ja), 8891 (Ja—44855, Ja). LOCALITY OF COLLECTION UNDETERMINED: Ashe s.n. [May 26, 1928] (Hi—59488).

AVICENNIA LANATA Ridl.

Additional bibliography: Moldenke, Phytologia 7: 206—209. 1960; Legris, Trav. Sect. Scient. Inst. Franç. Pond. 6: 547 & 556. 1963.

AVICENNIA LANCEOLATA (Engelh.) Moldenke

Additional bibliography: Moldenke, Phytologia 7: 209—210. 1960; Moldenke, Biol. Abstr. 35: 3688. 1960; Hocking, Excerpt. Bot. A.5: 46. 1962.

AVICENNIA MARINA (Forsk.) Vierh.

Additional synonymy: Avicennia sphaerocarpa "Stapf ex Ridley" apud Anon., Kew Bull. Gen. Index 1929-1956, 27. 1959. Avicennia officinalis Auct. ex Cuf., Bull. Jard. Bot. Brux. 32: Suppl. 803, in syn. 1962. Avicennia officinalis sensu Matsum. ex Liu, Illustr. Nat. & Introd. Lign. Pl. Taiwan 2: 1201, in syn. 1962. Avicennia nitida sensu Blanco ex Liu, Illustr. Nat. & Introd. Lign. Pl. Taiwan 2: 1201, in syn. 1962.

Additional & emended bibliography: F. Krauss, Flora 28: 68. 1845; W. Griff., Trans. Linn. Soc. Lond. 20: 1—7, pl. 1, fig. 8—12. 1846; A. Rich., Tent. Fl. Abyss. 2: 173. 1851; Aschers. in G. Schweinf., Beitr. Fl. Aethiop. 1: 118 & 278. 1867; Gürke in Engl., Pfl. Ost-Afr. C:342. 1895; Matsum., Bot. Mag. Tokyo 13: 133. 1899; Matsum. & Hayata, Journ. Coll. Sci. Univ. Tokyo 22: 304. 1906; Talbot, Forest Fl. Bombay 2: 363 & 364, fig. 457. 1911; Gamble, Fl. Madras 1105 & 1106. 1924; Kudo, Bot. Mag. Tokyo 46: 154. 1932; Jovet, Bull. Soc. Bot. France 82: 219. 1935; Kanehira, Form. Trees, rev. ed., 641, fig. 598. 1936; Fletcher, Kew Bull. Misc. Inf. 1938: 443 & 444. 1938; Anon., Kew Bull. Misc. Inf. 1938: index 27. 1938; Lam & Meeuse in Holthuis & Lam, Blumea 5: 235. 1945; Razi, Rec. Bot. Surv. India 18: 6. 1959; Anon., Kew Bull. Gen. Index 1929-1956, 27. 1959; Moldenke, Biol. Abstr. 35: 3688 (1960) and 36: 719. 1961; Nair & Rehman, Bull. Bot. Gard. Lucknow 76: 22 & 23, pl. 2, fig. 12, & text fig. 26. 1962; Liu, Illustr. Nat. & Introd. Lign. Fl. Taiwan 2: 1201, pl. 1009. 1962; Hocking, Excerpt. Bot. A.5: 45 & 46. 1962; Cuf., Bull. Jard. Bot. Brux. 32:

Suppl. 803. 1962; McLuckie & McKee, Austral. & N. Z. Bot., pr. 5, 88, 144, 459, 460, 658, 659, 662, & 700, fig. 31. 1962; Moldenke, Dansk Bot. Arkiv 23: 85. 1963; Li, Woody Pl. Taiwan 15, 817--818, & 942, fig. 329. 1963; H. P. Riley, Fam. Flow. Pl. S. Afr. 128. 1963; Legris, Trav. Sect. Scient. Inst. Franç. Pond. 6: 323, 547, & 556. 1963; Backer & Bakh., Fl. Java 2: 614. 1965; Anon., Biol. Abstr. 47 (17): S.18. 1966; J. S. Beard, Descrip. Cat. W. Austr. Pl. 91. 1966; Macnae, Austral. Journ. Bot. 14: 67, 71, & 74--76. 1966; Moldenke, Phytologia 14: 309. 1967.

Additional & emended illustrations: W. Griff., Trans. Linn. Soc. Lond. 20: pl. 1, fig. 8--12. 1846; Talbot, Forest Fl. Bombay 2: fig. 457 [as A. alba]. 1911; Kanehira, Form. Trees, rev. ed., fig. 598. 1936; Nair & Rehman, Bull. Bot. Gard. Lucknow 76: pl. 2, fig. 12 & text fig. 26. 1962; Liu, Illustr. Nat. & Introd. Lign. Fl. Taiwan 2: pl. 1009. 1962; McLuckie & McKee, Austral. & N. Z. Bot., pr. 5, fig. 31. 1962; Li, Woody Pl. Taiwan fig. 329. 1963.

Recent collectors describe this plant as a shrub, 1 m. or less in height, or a tree, 10--15 m. tall, the bark white or blackish, and the corolla dark-yellow or orange-yellow. Nair & Rehman (1962) describe the pollen as 3--4-zonicolporate, subprolate, 40 x 35 μ with a range of 39--42 x 32--37 μ, the colpi ends acute, tenuimarginate, the apocolpium diameter 10.5 μ, the endocolpium lalongate, 3.5--14 μ, the exine 2.8 μ thick, and the ectine slightly thicker than the endine, reticulate.

Talbot (1911), who misidentified this plant as A. alba Blume, describes it as follows: "A shrub usually gregarious; branches grooved, angular, finely white-tomentose. Leaves ovate-lanceolate, 2"--3" by .75"--1", acute at the apex and base; glabrous above, gray-tomentose beneath. Inflorescence as in the last species [A. officinalis]. Stamens included. Ovary and style villous. Capsule ovoid, flattened, .5"--75" long, smooth, yellow when ripe. Closely allied to A. officinalis. India in tidal swamps, common throughout the Konkan; on the trap near the sea-shore at Bandra, Bombay. Fl. apparently throughout the year."

Backer & Bakhuizen vam den Brink (1965) report that in Java this plant grows in the "mangrove (also in the more saline parts), banks of tidal streams", flowering all through the year. They describe it as "Flowers in 2--12-flowered heads, lowermost flower-pair sometimes distant from the other ones, but nevertheless the inflorescence not spiciform; adult heads 1/2--1 1/5 cm long; style robust, c. 1 1/2 mm long; stigmas recurved. Leaves elliptic-oblong or oblong-obovate, from an acute base, with an obtuse or rounded top, greenish-white beneath, 3--9 cm by 1 1/4--4 1/2 cm."

It has been collected on mud flats above the tide line. The flowers were "dark-yellow" on Steward 3112, but "orange-yellow" on Smitinand 5641. The latter collection is described as having had "blackish bark", while on Smitinand 5642 the bark is said to have been "white". This collector calls the plant "common by the sea" in Thailand and reports the vernacular name "samae thale".

From Portuguese East Africa we have reports of the names "mocho", "mũçu", "musso", and "staca". Riley (1963) reports that this species, which he misidentifies as A. officinalis L., is called "white mangrove" and grows in Mozambique, Natal, and the eastern section of Cape Province to the Kentani Division."

In general, the distribution of A. marina may be said to extend from Egypt to Arabia, along the shores of the Red Sea and the western Indian Ocean to the Cape of Good Hope, eastward along the shores of the Arabian Sea, the Bay of Bengal, the northern and western Indian Ocean, the south China Sea north to Hongkong and Formosa, and the islands of the Philippine Sea, Coral Sea, and the South Pacific to New Zealand. Beard (1966) reports that in Western Australia it is called "white mangrove" and the flowers are scented.

Doty & Alvarez 14342 is described as having had a "heavy algal coating on trunks and finger-like knees, no prop roots" -- a photograph of the trees in situ is mounted on the sheet with the specimen. Pierre s.n. [Siam, 1868] was first identified as A. officinalis L. by someone, then later as A. marina var. intermedia (Griff.) Bakh. A note appended to F. A. Mendonca 1045 avers that it matches Burtt 155, R. M. Graham 251, J. W. Gregory s.n., Hildebrandt 1241, Mearns 2145 & 2154, Schlieben 2547, and Volkens 160 in the herbarium of the British Museum. In Biol. Abstr. (1966) it is reported that a new species of fruitfly has been found infesting this plant.

McLuckie & McKee (1962) refer to the aerating roots or pneumatophores as "apo-geotropic", exposed to air at low tide. They note that soil air, in which the ordinary plant roots live, has a carbon dioxide content many times that of the atmosphere because of the respiration of roots and soil organisms and a slightly lower oxygen content. The pneumatophores have extensive aerenchyma in their cortex. They say that in the Sydney area the first colonizers of bare mud flats are Avicennia "officinalis" and the shrub Aegiceras majus; above this is the saltmarsh of Salicornia australis; above the tide level is the grass zone of Sporobolus virginicus, the rush zone of Juncus maritimus, and the sedge zone of Cladium junceum, then the saline swampy she-oak forest of Casuarina glauca, and then the freshwater swampy forest of Eucalyptus robusta.

Hochreutiner comments as follows: "Dans quelle mesure l'A. marina diffère-t-il spécifiquement de l'A. officinalis? L'examen de nombreux spécimens nous laisse dans le doute à ce sujet, un monographe seul pourrait décider. La forme des feuilles, invoquée par Vierhapper est non seulement variable suivant les individus, mais un grand nombre de spécimens sont hétérophylles. Le nombre des fleurs varie aussi et d'une manière indépendante de la forme des feuilles. Seule la disposition de ces fleurs en épis ± allongés ou en capitules et la dimension de la corolla qui varie de 3--15 mm. nous ont semblé avoir quelque constance, mais ce

sont là aussi caractères aléatoires. En revanche, le degré de villosité de l'ovaire et du style, invoqué par Bakhuizen nous a paru bien difficile à observer et laisse souvent planer de doute au sujet de l'identification. En réalité l'estrémité du style est toujours glabre. De sorte qu'il semblait plus judicieux de se contenter en l'occurrence d'une distinction variétale. Quant à la distinction variétale adoptée par Bakhuizen dans l'A. marina, nous l'avons appliquée d'après ses descriptions mais, on se rendra compte combien elle est précaire, en lisant sa clef analytique dont le première alternative invoque un caractère géographique et dépourvu de toute base morphologique. Nous serions tenté plutôt d'adopter le point de vue de Schimper (Bot. Mitt. aus den Tropen III, 98) qui rapporte tous les spécimens de l'Ancien monde à l'A. officinalis. Quelques distinctions variétales seraient pourtant probablement justifiées car nous avons noté expressément, sur place, que nos n. 1775 et 1776 étaient facilement reconnaissables et susceptibles d'être discernés l'un de l'autre. Nous avons rattaché les n. 1775 et 2866 à la var. intermedia et non à la var. Rumphiana à cause de leurs pétioles très courts car c'est là, en somme, la seule différence réelle que Bakhuizen reproduise sur ses planches."

The F. Krauss (1845) reference given in the bibliography above is often cited to Hochstetter, but the article in question is plainly credited to Krauss in the original!

Nair & Rehman (1962) cite a Nat. Bot. Gard. 44828, slide 3122, from India, while Li (1963) cites Mori & Morimoto s.n. from Formosa. The Yates 1110 distributed as A. marina is actually A. alba Blume, while Yates 2075 is A. officinalis L.

Additional citations: TANGANYIKA: H. G. Faulkner 1574 (B), 1591 (B); Tanner 2464 (B, S), 3414 (S). PORTUGUESE EAST AFRICA: Cabo Delgado: F. A. Mendonca 1045 (Ul), 1076 (Ul); Torre & Paiva 9616 (Ul). Inhambane: Gomes e Sousa 2098 (Ul). Lourenço Marques: Balsinhas 131 (Ul), 232 (Ul); Gomes e Sousa 155 (Ul), 3793 (Ul); Junod 517 (Ul). Mozambique: Torre e Paiva 11484 (Ul). SOUTH AFRICA: Natal: J. M. Wood 12973 (Bi). INDIA: Madras: E. K. Janaki 311 (Mi). CHINA: Fukien: A. N. Steward 3112 (Ca—44726). INDOCHINA: Cochinchina: Pierre s.n. [Hatien, 1/1874] (Ca—54861). THAILAND: Pierre s.n. [Siam, 1868] (Ca—54863); Smitinand 5641 [Herb. Roy. Forest Dept. 22952] (Gg), 5642 [Herb. Roy. Forest Dept. 22985] (Gg). WESTERN PACIFIC ISLANDS: PHILIPPINE ISLANDS: Cebu: Doty & Alvarez 14342 (Ac).

AVICENNIA MARINA var. RESINIFERA (Forst.) Bakh.

Additional & emended bibliography: W. Griff., Trans. Linn. Soc. Lond. 20: 1—7, pl. 1, fig. 1—7, 13, & 14. 1846; F. M. Bailey, Compreh. Cat. Queensl. Pl. 387. 1913; Rechinger, Denkschr. Akad. Wiss. Wien 89: 589, fig. 29. 1914; R. T. Baker, Journ. & Proc. Roy. Soc. N. S. Wales 49: 257—261, pl. 35, 45, 46, & 48. 1916; Bakh.

in Bakh. & Lam, Nov. Guinea 14, Bot.1: 172. 1924; J. M. Black, Fl. South Austr. 3: 483—484. 1926; Moldenke, Phytologia 7: 227—232 & 259—262. 1960; Moldenke, Biol. Abstr. 35: 3688 (1960) and 36: 719. 1961; Hocking, Excerpt. Bot. A.5: 45. 1962.

Additional illustrations: W. Griff., Trans. Linn. Soc. Lond. 20: pl. 1, fig. 1—7, 13, & 14. 1846; Rechinger, Denkschr. Akad. Wiss. Wien 89: 589, fig. 29 [as A. officinalis]. 1914; R. T. Baker, Journ. & Proc. Roy. Soc. N. S. Wales 49: pl. 35, 45, 46, & 48. 1916.

Recent collectors describe this plant as a tree, 8 m. tall, or prostrate, with yellow flowers and light yellow-green fruit. It has been found growing on the banks of streams and in much-browsed "wallum" with Pimela, Leptospermum, Goodenia, Drosera, and Lobelia, at 2 meters altitude, flowering in December and fruiting in February. The flowers are described as "yellow" on MacDaniels 2504. E. H. Walker 5352 bears a notation "prostrate form".

Bailey (1913) misidentifies this taxon as A. officinalis L. and records the additional vernacular names "egaie", "e-pumer", and "kum-moo-roo". It is similarly misidentified by Rechinger (1914), Baker (1916), Black (1926), and Laing & Blackwell (1940). Black tells us that it is found "In mud close to the sea all around our coasts of Australia, but NOT Tasmania. Found in Asia, New Zealand, East Africa, and Polynesia. Rhizophora also present, sending DOWN roots; Avicennia sends UP aerial roots." Laing & Blackwell report that Avicennia has an embryo with 2 fleshy cotyledons unaccompanied by any trace of a rootlet. Therefore it has to germinate by adventitious roots only. They say, inaccurately, that "A. officinalis occurs also in Australia, throughout Melanesia and Malaysia to India and north to Mount Sinai on the Red Sea." They note that New Zealand has no Anopheles mosquitoes and so there is no malaria in its mangrove swamps as there is everywhere else in the world; also that this is the mangrove of the Auckland coast north of Kawhia on the west and of Opotiki on the east.

Rechinger (1914) notes "Mit auffallend schmalen Laubblättern.. Solomons-inseln: Insel Buka. Auf dem Strandriff mit Aegiceras corniculatum Blanco und Rhizophora-Arten." Baker (1916) discusses the morphology and wood anatomy and records the name "grey mangrove". His work is sometimes inaccurately cited as "1915".

Material of this variety has been misidentified and distributed in herbaria as A. officinalis L. On the other hand, the Kajewski 2344, in part, distributed as A. marina var. resinifera, is actually A. eucalyptifolia Zipp.

Additional citations: MELANESIA: NEW CALEDONIAN ISLANDS: New Caledonia: MacDaniels 2504 (Ca—54017); H. S. McKee 2114 (Go). AUSTRALIAN REGION: AUSTRALIA: Queensland: M. S. Clemens s.n. [23 September 1946] (Mi). South Australia: Kaspiew 38 (S), 539 (B). NEW ZEALAND: North Island: E. H. Walker 5352 (Ca—923408). Rangi-

toto Island: Meebold 5233 (Bi).

AVICENNIA MARINA var. RUMPHIANA (H. Hallier) Bakh.

Additional & emended bibliography: Lam & Meeuse in Holthuis & Lam, Blumea 5: 235. 1945; Moldenke, Phytologia 7: 262—266. 1960.

Lam & Meeuse (1945) record this plant from Karakalang Island in the Greater Sunda Islands.

Additional citations: WESTERN PACIFIC ISLANDS: PHILIPPINE ISLANDS: Mindanao: Elmer 1045a (Bi), 12006 (Bi). MELANESIA: GREATER SUNDA ISLANDS: British North Borneo: Cuadra s.n. [Herb. North Borneo Forest. Dept. A.3187] (W--2129128).

AVICENNIA OFFICINALIS L.

Additional synonymy: Avicennia officinalis (L.) Kurtz ex Fletcher, Kew Bull. Misc. Inf. 1938: 443, in syn. 1938.

Additional & emended bibliography: A. Rich., Tent. Fl. Abyss. 2: 173. 1851; Aschers. in G. Schweinf., Beitr. Fl. Aethiop. 1: 118 & 278. 1867; Beddome, Fl. Sylv. Anal. Gen. 174, pl. 22. 1872; Brandis, For. Fl. NW. & Cent. Ind. 3: 371. 1874; Treub, Ann. Jard. Bot. Buitenz. 3: 79—88, pl. 14 & 15. 1883; Warb. in Engl., Bot. Jahrb. 13: 426—427. 1891; W. A. Talbot, Syst. List Trees Shrubs Bomb. 163 & 214. 1894; Gürke in Engl., Pfl. Ost-Afr. C: 342. 1895; Just, Bot. Jahresber. 23: 134, 155, & 506. 1897; J. Matsum., Bot. Mag. Tokyo 13: 133. 1899; C. B. Clarke in J. Schmidt, Bot. Tidsskr. 26: 175. 1904; Matsum. & Hayata, Journ. Coll. Sci. Univ. Tokyo 22: 304. 1906; E. D. Merr., Philip. Journ. Sci. Bot. 1, Suppl. 1: 122. 1906; Kawakami, List Pl. Formos. 83. 1910; A. Stewart, Proc. Calif. Acad. Sci., ser. 4, 1: 131—132. 1911; Guillaumin, Ann. Mus. Colon. Marseille 9: 66 & 208. 1911; Despeissis, W. Austr. Dept. Agr. Bull. 13, ed. 1, 94—95. 1911; W. A. Talbot, Forest Fl. Bombay 2: 361—364, fig. 456. 1911; Dunn & Tutcher, Kew Bull. Misc. Inf. Addit. Ser. 10: 205. 1912; J. Matsum., Ind. Pl. Jap. 2: 528. 1912; F. M. Bailey, Compreh. Cat. Queensl. Pl. 387. 1913; Liebau, Beitr. Anat. & Morphol. Mangrove 2. 1913; R. T. Baker, Journ. & Proc. Roy. Soc. N. S. Wales 49: 257—281, pl. 35, 45, 46, & 48. 1916; Bose, Man. Ind. Bot. 253, fig. 220. 1920; H. N. Ridl., Journ. Fed. Malay States Mus. 10: 151 & 152. 1920; Despeissis, West & Trop. North, ed. 3. 1921; Gamble, Fl. Presid. Madras 1105 & 1106. 1924; H. J. Lam in Engl., Bot. Jahrb. 59: 29. 1924; J. M. Black, Fl. South. Austr. 3: 483—484. 1926; S. Sasaki, List Pl. Formos. 349. 1928; Schnarf in Linsb., Handb. Pflanzenanat. 10 (2): 233 & 380. 1929; Schencke, Zytol. Untersuch. Verbenac. 7 & 31. 1931; Kudo, Bot. Mag. Tokyo 46: 154. 1932; Patermann, Beitr. Zytol. Verbenac. 46, 48, & 49. 1935; Jovet, Bull. Soc. Bot. France 82: 219. 1935; Fletcher, Kew Bull. Misc. Inf. 1938: 443 & 444. 1938; Anon., Kew Bull. Misc. Inf. 1938: index 27. 1938; W. A. Talbot, Trees & Shrubs, ed. 3, 408. 1949; Dastur, Useful Pl. India 38. 1952; Anon., Kew. Bull. Gen. Index 1929-1956, 27. 1959; Moldenke, Phytologia 7: 267—280 & 293. 1960; Santapau, Fl. Bombay & Salsette [3]. 1960; Swamy & Padmanabhan, Curr. Sci. India 30: 424—425.

1961; E. L. Little, Phytologia 8: 50—52 & 54—56. 1961; Khan, Pakist. Journ. Forest. 11: 43—45. 1961; Cuf., Bull. Jard. Bot. Brux. 32: suppl. 803. 1962; Anon., Biol. Abstr. 38: 1203. 1962; Nair & Rehman, Bull. Bot. Gard. Lucknow 76: 22. 1962; Liu, Illustr. Nat. & Introd. Lign. Pl. Taiwan 2: 1201. 1962; McLuckie & McKee, Austral. & N. Z. Bot., pr. 5, 662 & 700. 1962; Padmanabhan, Journ. Madras Univ. 32B: 13—19. 1962; Meher-Homji, Trav. Sect. Scient. Inst. Franç. Pond. 7: 164 & 166. 1963; H. P. Riley, Fam. Flow. Pl. S. Afr. 128. 1963; Li, Woody Pl. Taiwan 818. 1963; Malaviya, Proc. Indian Acad. Sci., ser. B, 58: 45—50 & 351, fig. 1—20. 1963; Legris, Trav. Sect. Scient. Inst. Franç. Pond. 6: 322, 323, 547, & 556. 1963; H. & E. Boyko, Trans. N. Y. Acad. Sci., ser. 2, 26: 1091. 1964; Malaviya, Biol. Abstr. 45: 5670 (1964) and 45 (16): B.13. 1964; Van Steenis, Fl. Males. Bull. 19: 1113. 1964; D. E. Ferguson, Biol. Abstr. 45: 4257 & B.13. 1964; B. Singh, Bull. Nat. Bot. Gard. Lucknow 89: 14. 1964; Backer & Bakh., Fl. Java 2: 613. 1965; Moldenke, Résumé Suppl. 12: 9. 1965; Mani, Bull. Bot. Surv. India 7: 114. 1965.

Additional & emended illustrations: W. A. Talbot, Forest Fl. Bombay 2: fig. 456. 1911; Bose, Man. Ind. Bot. fig. 220. 1920; Khan, Pakist. Journ. Forest. 11: 43—45. 1961; Malaviya, Proc. Indian Acad. Sci., ser. B, 58: 45—50, fig. 1—20. 1963.

Talbot (1949) describes the wood of this species as gray, the heartwood darker, hard, heavy, brittle, composed of well-marked concentric layers which consist of a ring of white tissue sometimes anastomosing with the ring of the next layer; the ring is lined with a row of moderate-sized pores, often containing a black substance; fine pores surrounded with white tissue are equally distributed throughout the layer; medullary rays fine, white, uniform; weight 66 pounds to the cubic foot; bark contains tannin; "used in India only for firewood". He records it as growing in "mangrove swamps of the Deccan peninsula and Ceylon, common in salt marshes and along the banks of tidal rivers and creeks, throughout the Konkan and North Kánara, flowering from March to May, the fruit ripe in July and August." In his 1911 work he erroneously places A. tomentosa Jacq. in the synonymy of this taxon.

Malaviya (1963) reports that the thick-walled lignified pitted cells found in the stem and leaf of this plant may be placed in the category of brachysclereids or "stone cells" of Tscherich and Foster. These are actually transformed parenchyma cells in the stem, a hypodermal or mesophyll cell in the petiole and lamina of the leaf. They are formed by secondary sclerosis of these parenchyma cells. Baker (1916) also discusses the wood anatomy as well as the morphology, but his plant was probably A. marina var. resinifera (Forst.) Bakh. Nair & Rehman (1962) give the size of the pollen grains as 35 x 32 μ.

Patermann (1935) says: "Treub (1882) über Avicennia officinalis, dass die Verbenaceen in der Endospermwicklung wesentliche Unterschiede zeigen die ohne Zweifel für die verschiedenen Unterfamilien charakteristisch sind....Immerhim dürften wir in der

Endospermwicklung von A. officinalis den spezialisiertesten Typus finden und dadurch auch zytologische die Anordnung dieser Unterfamilien (Avicennioideae) als zu Recht bestehend bestätigen."

Dastur (1952) tells us that in India and Pakistan the astringent bark of this tree is used for tannin, the wood ashes for washing clothes, the green fruit as a poultice in the treatment of boils, and the ripe fruit as food; painters mix the ashes with their color pigments to make them adhere better; the wood is used to make cheap beams and door-frames, but chiefly as fuel.

Mani (1965) describes a subglobose, agglomerate, solid, fleshy, verrucose pouch-gall made by an Eriophyes sp., 2--4 mm. large, the outer surface densely clothed with hair-like parenchyma emergences — his gall no. 507.

Additional vernacular names recorded for this plant are "hái-ka-tang", "hái-ka-tín", "hirugi-damashi", "hirugi-damasi", "hirugi-modoki", "ipati", "kari", and "white mangrove tree".

The "A. officinalis Auct." often referred to in literature is a synonym of A. marina (Forsk.) Vierh. Lam's note in Engler's Bot. Jahrb. (1924) is often erroneously cited as "1925", which is the title-page date for the completed volume. Boyko (1964) records this species as cultivated in Egypt, but I strongly suspect that he is referring to A. marina. The "A. officinalis L." of F. M. Bailey (1913) and the vernacular names which he records from Queensland doubtless belong under A. marina var. resinifera (Forst.) Bakh., as do also the Solomon Islands material and illustration cited by Rechinger (1914). Guillaumin (1911) cites Pennel 81 and Heun 279, but doubtless these represent misidentifications. Lam (1925) cites Volkens 193 from Yap, but this collection actually is A. alba Blume.

The G. F. Gaumer 635 [Herb. Umbach 15479], Schimpff 30, Snodgrass & Heller 605, and A. Stewart 3266, 3267, 3268, 3269, 3270, 3271, 3272, 3273, & 3274, distributed as A. officinalis, are actually A. germinans (L.) L.; E. K. Janaki 311, F. A. Mendonca 1045, Pierre s.n. [Siam, 1868], and J. M. Wood 12973 are A. marina (Forsk.) Vierh.; H. S. McKee 2114 and Meebold 5233 are A. marina var. resinifera (Forst.) Bakh.; and Elmer 1045a & 12006 are A. marina var. rumphiana (H. Hallier) Bakh.

Additional citations: INDIA: Bombay: H. St. John 24066 (Bi). MALAYA: Singapore: M. R. Henderson 34770 (S). WESTERN PACIFIC ISLANDS: PHILIPPINE ISLANDS: Luzon: Elgincolin s.n. [Herb. Philip. Forest. Bur. 28064] (Bi). Palawan: Kondo & Edaño 9242 [Philip. Nat. Herb. 36601] (Bi). INDONESIA: GREATER SUNDA ISLANDS: Sumatra: Yates 2075 (Mi). MELANESIA: NEW GUINEA: Papua: A. Hart s.n. [Herb. New Guinea Forest. Dept. 4530] (Bi).

AVICENNIA SCHAUERIANA Stapf & Leechman

Additional synonymy: Avicennia tomentosa sensu Mayc. apud Gooding, Loveless, & Proctor, Fl. Barbados 365, in syn. 1965.

Additional bibliography: Moldenke, Phytologia 7: 280—290. 1960; Angely, Fl. Paran. 16: 38 (1960) and 17: 15. 1961; Reitz, Sellowia 13: 29, 44—46, & 109. 1961; Angely, Bibl. Veg. Paran. 195. 1964; Moldenke, Résumé Suppl. 12: 3. 1965; Gooding, Loveless, & Proctor, Fl. Barbados 365—366 & 465. 1965.

Additional illustrations: Reitz, Sellowia 13: 45 & 46. 1961.

Reitz (1961) calls the association in which this species grows the "avicenieto". The Hahn 654, cited below, is a mixture with A. germinans (L.) L.

Additional citations: WINDWARD ISLANDS: Martinique: Hahn 654, in part (Ca—332488). TRINIDAD: Cowan & Forster 1252 (N). BRAZIL: Ceará: Drouet 2548 (W—1594887). Guanabara: A. Castellanos 23460 [Herb. Cent. Pesq. Florest. 1720] (Ac); Scheiman 108 (Ja—114108); J. Vidal s.n. [30/5/1934] (Ja—36839), s.n. [21 de Junho de 1934] (Ja—36838, Ja). Rio de Janeiro: Abreu s.n. [VIII/1925] (Ja—31572); Dusén 1963 (Ja—44852); Glaziou 1362 (Ja—11185); Schwacke 3111 [Herb. Saldanha 5962] (Ja—44866, Ja, Ja), s.n. [Maná, 16/I/1887] (Ja—44865); Ule 3884 (Ja—37434). Santa Catarina: Reitz 5088 (N); Reitz & Klein 683 (W—2281838), 1183 (Ca—46892). Falhas Island: Magalhães Corrêa s.n. [Oct. 1936] (Ja—30128). Gobernador Island: Rente & Rente s.n. [18.II.1958] (Ac, Ja, Ja, Ja). Paquetá Island: Descartes 7 (Ja—36350). Saravata Island: J. Vidal s.n. [Junho 1934] (Ja—31546, Ja, Ja).

AVICENNIA TONDUZII Moldenke

Additional bibliography: Moldenke, Phytologia 7: 290—292. 1960; Moldenke, Biol. Abstr. 36: 719. 1961.

Additional citations: COSTA RICA: Puntarenas: Tonduz 6776 (Mi—isotype).

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ADDITIONAL NOTES ON THE GENUS PRIVA. IV

Harold N. Moldenke

PRIVA Adans.

Additional synonymy: Tertula "Roxb. ex Willd." apud Brenan, Mem. N. Y. Bot. Gard. 9: 37, sphalm. 1954.

Additional & emended bibliography: A. L. Juss., Ann. Mus. Nat. Hist. Nat. Paris 7: 69—72. 1806; Mirbel, Ann. Mus. Nat. Hist. Nat. Paris 15: pl. 14, fig. 2. 1810; Hook., Bot. Misc. 1: 159, 172, & 173. 1829; Peterm., Cod. Bot. Linn. Ind. Alph. 196. 1840; Endl., Cat. Hort. Acad. Vindob. 2: 47. 1843; F. Krauss, Flora 28: 68. 1845; Walp., Repert. 6: 687. 1847; D. Clos, Ann. Sci. Nat., ser. 3, 10: 378—381. 1848; Bocq., Adansonia 2: 87—89, 94—99, 101, 109, 116, 123, 125, 130, 136, 139, 140, 143, 146—149, 152, & 154 (1862)

and 3: 180, 182—185, 211—213, & 239—240, pl. 18. 1863; Bocq., Rev. Verbenac. 87—89, 94—99, 101, 109, 116, 123, 125, 130, 136, 139, 140, 142, 143, 146—149, 152, 154, 180, 182—185, 211—213, & 239—240, pl. 18. 1863; Griseb., Cat. Pl. Cuba 214. 1866; H. Mann, Enum. Hawai. Pl. 194. 1867; Aschers. in G. Schweinf., Beitr. Fl. Aethiop. 278. 1867; R. A. Phil., Anal. Univ. Chil. 35: 193. 1870; A. Gray, Syn. Fl. N. Am. 2 (1): 333 & 334. 1878; Franchet, Sert. Somal. 50. 1882; A. S. Hitchc., Ann. Rep. Mo. Bot. Gard. 4: 117. 1893; Just, Bot. Jahresber. 23 (2): 47, 76, & 595. 1897; J. G. Baker in Thiselt.-Dyer, Fl. Trop. Afr. 5: 285. 1900; Durand & Jacks., Ind. Kew. Suppl. 1: 347. 1906; Reiche, Fl. Chile 5: 304. 1910; M. Kunz, Anatom. Untersuch. Verb. 54—55. 1911; A. Stewart, Proc. Calif. Acad. Sci., ser. 4, 1: 134. 1911; Loes., Verh. Bot. Ver. Brand. 53: 80 [Abhandl. 245]. 1912; Prain, Ind. Kew. Suppl. 5: 207. 1921; Gamble, Fl. Madras 1085 & 1090—1091. 1924; Britton & P. Wils., Scient. Surv. Porto Rico 6: 137 & 144—145. 1925; A. W. Hill, Ind. Kew. Suppl. 6: 166 (1926) and 7: 197. 1929; Baeza, Nomb. Vulg. Pl. Silv., ed. 2, 63, 176, & 263. 1930; Schwenke, Zytol. Untersuch. Verbenac. 23—26 & 43. 1931; A. W. Hill, Ind. Kew. Suppl. 8: 194. 1933; Patermann, Beitr. Zytol. Verbenac. 23—25, pl. 2, fig. 15—17, & pl. 5, fig. 5. 1935; Chiov., Racc. Bot. Miss. Consol. Kenya 98. 1935; H. B. Davis, Life & Works Pringle 669. 1936; A. W. Hill, Ind. Kew. Suppl. 9: 223. 1938; Robledo, Lecc. Bot. 2: 499. 1940; Schnack, Anal. Inst. Fitotéc. Sta. Catalina 4: 18. 1942; Schnack & Covas, Darwiniana 6: 471. 1944; Darlington & Janaki Ammal, Chromosome Atl. 270. 1945; Hill & Salisb., Ind. Kew. Suppl. 10: 184. 1947; Asprey & Robbins, Ecol. Monog. 23: 411. 1953; E. J. Salisb., Ind. Kew. Suppl. 11: 203. 1953; Moldenke, Phytologia 5: 31—32, 61—80, & 105—111. 1954; J. Rzedowski, Anal. Esc. Nac. Cienc. Biol. 8: 105. 1954; Brenan, Mem. N. Y. Bot. Gard. 9: 37. 1954; Anon., Assoc. Etud. Tax. Fl. Afr. Trop. Index 1954: 66. 1955; Anon., Trav. Lab. Bot. Syst. Brux. 16: 66. 1955; Darlington & Wylie, Chromosome Atl., pr. 1, 323 & 515. 1955; Moldenke, Verbenac. 15. 1955; Moldenke, Biol. Abstr. 29: 2214 & 2936. 1955; Moldenke in Humbert, Fl. Madag. 174: 3 & 26—33. 1956; Moldenke, Inform. Mold. Set 51 Spec. 4. 1956; Angely, Cat. Estat. Gen. Bot. Fan. 17: 5. 1956; Anon., Biol. Abstr. 29: 3469. 1957; Alain in León & Alain, Fl. Cuba 4: 280 & 302. 1957; B. H. Johnson, Wasmann Journ. Biol. 16: 295. 1958; G. Taylor, Ind. Kew. Suppl. 12: 114. 1959; Moldenke, Résumé 13, 28, 30, 38, 40, 42—45, 47—50, 53, 54, 55, 57—64, 68, 73, 76—78, 80, 81, 84, 104, 114, 117, 133—135, 142, 143, 145, 146, 149—151, 154, 156, 158—160, 164, 166, 167, 190, 222, 237, 238, 240, 279, 334, 340, 341, 343, 350, 353, 355, 357, 358, 362, 364—366, 368—370, 373, 377, 378, 393—396, 407, 419, 424, 467, & 468. 1959; Sebastine, Bull. Bot. Surv. Ind. 1: 95. 1959; Meeuse, Bothalia 7: 424—425. 1960; Angely, Liv. Gen. Bot. Bras. 35 & 52. 1960; Anon., Assoc. Etud. Tax. Fl. Afr. Trop. Index 1960: 60. 1961; Darlington & Wylie, Chromosome Atl., pr. 2, 323 & 515. 1961; Lewis & Oliver, Am. Journ. Bot. 48: 641. 1961; Runner, Rep. G. W. Groff Coll. 362. 1961; Cuf., Bull. Jard. Bot. Brux. 32: Suppl. 794—795. 1962; Dyer, Verdoorn, Codd, & Letty, Wild Fls. Transv. 280 1962; Hepper in Hutchinson &

Dalz., Fl. W. Trop. Afr., ed. 2, 2: 434—435. 1963; Rollins, Taxon 12: 215. 1963; Huber, Hepper, & Meikle in Hutchinson & Dalz., Fl. W. Trop. Afr., ed. 2, 2: 432. 1963; H. P. Riley, Fam. Flow. Pl. S. Afr. 128. 1963; Moldenke in Shreve & Wiggins, Veg. & Fl. Son. Des. 2: 257. 1964; Punt, Reg. Veg. 36: 18. 1964; Langman, Select. Guide Lit. Flow. Pl. Mex. 208, 402, 413, 515, 517, & 1010. 1964; C. K. Allen, Bull. Torrey Bot. Club 91: 332. 1964; Moldenke, Phytologia 10: 91. 1964; Moldenke, Résumé Suppl. 11: 8 (1964) and 12: 3, 7, & 12. 1965; Backer & Bakh., Fl. Java 2: 598-599. 1965; Gooding, Loveless, & Proctor, Fl. Barbados 354, 362—363, & 481. 1965; Moldenke, Phytologia 12: 6 & 20. 1965; Moldenke, Bol. Soc. Brot., ser. 2, 39: 131—132. 1965; Anon., Assoc. Etud. Tax. Fl. Afr. Trop. Index 1965: 67. 1966; Anon., Gen. Costa Ric. Phan. 10. 1966; G. Taylor, Ind. Kew. Suppl. 13: 18, 109, & 149. 1966.

To be added to the list of excluded species:
Priva mitchelii Endl., Cat. Hort. Acad. Vindob. 2: 47. 1843 = Phryma leptostachya L., Phrymaceae

Riley (1963) gives the basic chromosome number for the genus Priva as 12. The Hooker (1829) reference in the bibliography above is often mis-dated "1830". The "Bot. Zeit. 3: 587 (1845)" and Flora 29: [207] (1846)" references sometimes given for this genus appear to be erroneous, since there is no mention of the genus on those pages of the works in question.

PRIVA ADHAERENS (Forsk.) Chiov.

Additional synonymy: Verbena forskaelei Vahl ex Willd., Sp. Pl. 1: 118—119. 1797. Verbena forskaehlei Vahl ex Steud., Nom. Bot., ed. 1, 657, in syn. 1821. Verbena forskohlei Vahl ex Steud., Nom. Bot., ed. 1, 873, in syn. 1821. Priva adhaerens Chiov. apud A. W. Hill, Ind. Kew. Suppl. 7: 197. 1929. Priva leptostachya Auct. ex Cuf., Bull. Jard. Bot. Brux. 32: Suppl. 794, in syn. 1962 [not P. leptostachya A. L. Juss., 1806].

Additional & emended bibliography: Willd., Sp. Pl. 1: 118—119. 1797; A. L. Juss., Ann. Mus. Nat. Hist. Nat. Paris 7: 70. 1806; J. Sm. in Rees, Cycl. 36: no. 14. 1817; Steud., Nom. Bot., ed. 1, 657, 873, & 874 (1821) and ed. 2, 2: 397 & 750. 1841; F. Krauss, Flora 28: 68. 1845; A. Rich., Tent. Fl. Abyss. 2: 165. 1851; Bocq., Adansonia 3: [Rev. Verbenac.] 212. 1863; Aschers. in G. Schweinf., Beitr. Fl. Aethiop. 1: 120. 1867; Jacks. in Hook. f. & Jacks., Ind. Kew. 2: 628. 1894; A. W. Hill, Ind. Kew. Suppl. 7: 197. 1929; Hutchinson & Bruce in Gillett, Kew Bull. Misc. Inf. 1941: 176. 1941; Moldenke, Phytologia 5: 62—63. 1954; Moldenke, Résumé 134, 135, 145, 146, 154, 158, 334, 340, 343, 353, 364, 393, & 467. 1959; Cuf., Bull. Jard. Bot. Brux. 32: Suppl. 794. 1962; Moldenke, Résumé Suppl. 12: 7. 1965.

Krauss (1845) cites Krauss 420. Smith (1817) records the common name "Arabian vervain".

Additional & emended citations: SUDAN: Lord s.n. [Upper Camp,

Hot Tamarib, 2/69] (Ca—331299). ANGOLA: Mossamedes: Exell & Mendonça 2121 (Ul). SOUTH AFRICA: Natal: Kuntze s.n. [Durban, III.94] (W—633155).

PRIVA AFRICANA Moldenke

Additional bibliography: Hill & Salisb., Ind. Kew. Suppl. 10: 184. 1947; Moldenke, Phytologia 5: 63 & 105. 1954: Moldenke, Inform. Mold. Set 51 Spec. 4. 1956; Moldenke, Résumé 154 & 467. 1959.

In my 1936 work, on page 36, there is an incorrect set of figures in the Latin diagnosis of this species. The phrase should read "dentibus remotis 4 vel 5, infimis saepe subloboideis". The Van Dam s.n. [Dec. 1924] and the Codd & Dyer 3886 specimens, cited below, were previously cited by me as being deposited in the Britton Herbarium or in my personal herbarium.

Recent collectors describe this species as a small, perennial, suffruticose plant, forming dense usually many-stemmed clumps 30–60 cm. tall, or a 12-inch shrublet, growing on mopane veld on limestone formations, in dry sandy Acacia thornveld in open places and shallow pans, and in open spaces in dry sparse thornveld on alkaline and probably calcareous soils, at 1800 feet altitude, blooming in March and December. The flowers are described as "pink" on Meeuse 10222, as "mauve" on L. E. Codd 3886, and as "chalk-white, rather large and striking" on Meeuse 9477.

Dr. Meeuse notes "Now that I have seen this species in the field, I can tell you that it is so distinct! It grows in dry deep sandy soil, probably by preference on slightly brackish soil. Flowers large, white. Other Priva species I have collected grow in light shade, have pale mauve or pinkish flowers, etc."

Additional & emended citations: PORTUGUESE EAST AFRICA: Lourenzo Marques: Myre & Carvalho 1423 (Ul). SOUTH AFRICA: Transvaal: L. E. Codd 3886 (Cb, Ss); Meeuse 9477 (Z), 10222 (S); Van Dam s.n. [Dec. 1924] (Ss).

PRIVA ANGOLENSIS Moldenke

Bibliography: Moldenke, Bol. Soc. Brot., ser. 2, 39: 131—132. 1965; Moldenke, Résumé Suppl. 12: 7. 1965; Anon., Assoc. Etud. Tax. Fl. Afr. Trop. Index 1965: 67. 1966.

Herb, woody at the base, to 1.2 m. tall; branches erect, tetragonal, sulcate, densely pubescent with spreading uncinate hairs, narrowed and conspicuously annulate at the nodes; leaves decussate-opposite, subsessile; petioles obsolete or to about 2 mm. long, uncinate-pubescent; leaf-blades rotund-ovate, 4.5—5.5 cm. long, 3—4 cm. wide, rounded in outline at the apex, rather regularly and coarsely serrate-dentate from almost the base to the apex with rather broad-based acute or rounded teeth, subtruncate at the base and abruptly acuminate or cuneate into the petiole, scattered-pilose with uncinate hairs on both surfaces, more densely so on the venation beneath; inflorescence terminal, racemose and spike-like, 50 cm. long or longer, many-flowered, dense during

anthesis, later elongating so that the fruits are separated from each other by 1—2 cm.; peduncle elongate, about 13 cm. long, tetragonal, sulcate, and uncinate-pubescent like the stem and continuous with it; rachis similar to the stem and peduncle in all respects; bractlets narrowly elliptic, about 4 mm. long, attenuate at the apex, narrowed at the base, white-ciliate on the margins with mostly stiff straight hairs; pedicels filiform, 1—2 mm. long, erect during anthesis, reflexed in fruit, densely puberulent-pubescent with brownish hairs; calyx tubular, about 7--8 mm. long, densely pubescent, the rim very shallowly and inconspicuously 5-toothed or very shortly 5-apiculate; corolla hypocrateriform, its tube cylindric, ampliate above, about 1.2 cm. long, white, the throat white, the limb 5-parted, the segments suffused with rose, 6 or more mm. long; stamens included; pistil about 1 cm. long, glabrous; fruiting-calyx inflated, rotund, short-rostrate, about 8 mm. long and 6 mm. wide, very densely uncinate-pubescent; cocci tuberculate on the dorsal surface, not spiny.

The type of this species was collected by E. J. Mendes (no. 1650) at the edge of a lake opposite Rio Cunene, between Forte Roçadas and Humbe, Angola, on February 8, 1956, and is deposited in the herbarium of the Centro de Botânica da Junta de Investigações do Ultramar at Lisbon. Thus far the species is known only from the type specimen.

Citations: ANGOLA: Huila: E. J. Mendes 1650 (Ul—type).

PRIVA ARMATA S. Wats.

Additional bibliography: Durand & Jacks., Ind. Kew. Suppl. 1: 347. 1906; M. Kunz, Anatom. Untersuch. Verb. 54. 1911; H. B. Davis, Life & Works Pringle 669. 1936; Moldenke, Phytologia 5: 63. 1954; Moldenke, Résumé 38 & 467. 1959.

Additional & emended citations: MEXICO: Nuevo León: Pringle 1931 (Ca—104889—isotype, W—480185—isotype, W—1323168—isotype), 2674 (Ca—41900, E—118785). MOUNTED ILLUSTRATIONS: Kobuski drawing 11 (E—925406), 20 (E—925405).

PRIVA ASPERA H.B.K.

Additional bibliography: Bocq., Adansonia 3: [Rev. Verbenac.] 239. 1863; Jacks. in Hook. f. & Jacks., Ind. Kew. 2: 628. 1894; Durand & Jacks., Ind. Kew. Suppl. 1: 347. 1906; M. Kunz, Anatom. Untersuch. Verb. 54. 1911; Loes., Verh. Bot. Ver. Brand. 53: 80 [Abhandl. 245]. 1912; Hill & Salisb., Ind. Kew. Suppl. 10: 184. 1947; Moldenke, Phytologia 5: 63—66. 1954; Moldenke, Résumé 38, 42, 45, 47, 222, 237, 340, & 467. 1959.

Recent collectors describe this plant as a bushy herb, suffrutescent or shrubby, 3—6 feet tall or taller, the root heavy, woody, the stems square, dull-purple, and the fruit purple when young, becoming purplish-black when mature, growing at altitudes of 50 to 2700 meters. They have found it in loam, sandy loam, or heavy red clay-loam, by stone fences in llanos, along trails and streambanks, in vacant fields, partially grazed moist Quercus

forests with epiphytic ferns, small rocky mixed corn-squash-potato fields and their weedy stonewall-Opuntia borders with Solanum bulbocastanum and a non-tuberous Solanum sp. whose berries are edible when cooked, in partial shade, on slopes with Pinus and Liquidambar, on steep hillsides in pine forests, steep rocky slopes with Quercus, west-facing hillslopes under coffee bushes, and on steep hillsides with many moist cliffs covered with mosses in the Pinus-Quercus zone.

King refers to the species as "occasional in open grazed areas, open sun"; King & Soderstrom call it a "common succulent annual to over 2 m. tall"; Feddema calls it "uncommon", while McVaugh says that it is "abundant and weedy on barrancas"; the Wilburs refer to it as "occasional along roadsides in open oak woods".

The corollas are said to have been "pink" on Breedlove & Raven 11933 & 13084, Hinton 13154, King & Soderstrom 4762, and R. McVaugh 12931 & 18911; "lavender" on Breedlove 11837 and Feddema 709; "violet" on R. M. King 1967; "pale pink-lavender" on Tucker 786; "pale-lavender" on J. A. Steyermark 47097; "red" on Wilbur & Wilbur 2286; and "purplish-pink, the upper lip lined reddish" on R. McVaugh 17349.

The J. Rzedowski 6280 and Shreve 9138, distributed as P. aspera, are actually P. mexicana (L.) Pers., while Mann & Brigham 74 and Stokes s.n. [Hawaii] are Salvia occidentalis Sw. in the Lamiaceae.

Additional & emended citations: MEXICO: Chiapas: Breedlove 7715 (Ac), 11837 (Rf), 11933 (Rf); Breedlove & Raven 13084 (Ac); Seler & Seler 2679 (W--1205554). Chihuahua: Pringle 287 (Ca--169176, E--118775, W--154992); Townsend & Barber 422 (E--118772, W--347182). Guerrero: Hinton 9601 (Rf), 10687 (Rf, Ur), 11517 (Rf). Jalisco: R. McVaugh 12931 (Mi), 17349 (Mi), 20178 (Mi); Edw. Palmer 500 (W--43501, W--481205); Wilbur & Wilbur 2029 (Mi), 2286 (Mi). México: Hinton 4459 (Rf), 4813 (Du--350306, Rf); Roe, Roe, Mori, & Rzedowski 1678 (Ws). Michoacán: Arsène 2545 (W--1003564), 2796 (E--844844, W--1003562), 5292 (E--844852, W--1003561), 8696 (E--840008, F--485027, W--1032260), s.n. [N. O. du Punqueto, Sept. 1910] (E--844842, W--1003570), s.n. [19/9/1909] (W--1003566); Hinton 12170 (Rf), 13154 (Mi, Rf), 15625 (Rf); King & Soderstrom 4762 (N, Z); Ugent & Flores C.2118 (Ws). Nayarit: Feddema 709 (Mi); R. McVaugh 18911 (Mi); Edw. Palmer 1999 (W--305277). Oaxaca: R. M. King 1967 (Au, Mi). San Luis Potosí: Parry & Palmer 713, in part (E--118782). Sinaloa: Dehesa 1644 (W--1035802). Vera Cruz: Botteri 319 (W--771867); Bourgeau 2950 (Ca--322966); Purpus 1921 (Ca--139746, E--118808), 5727 (Ca--162550), 8054 (Ca--198450, E--825642, E--825643, W--891457), s.n. [Zacuapan] (Ca--139744); Seaton 465 (W--57693). State undetermined: Hahn s.n. [1865--66] (W--43519). GUATEMALA: Alta Verapaz: Türckheim II.1628 (W--1323163, W--1323164).

Amatitlan: Morales Ruano I.172 (F--601154). Guatemala: Rojas 64 (W--1166629). Huehuetenango: Melhus & Goodman 3671 (Ok). Sololá: J. A. Steyermark 47097 (N). Department undetermined: Heyde 206 (W--248341). EL SALVADOR: Morazán: Tucker 786 (Ca--1000899). COSTA RICA: Cartago: P. C. Standley 35873 (W--1227281). CENTRAL AMERICA: Locality of collection undesignated: Ørsted 11183 (W--1269901). MOUNTED ILLUSTRATIONS: Kobuski drawing 14 (E--925406), 23 (E--925405).

PRIVA AURICOCCEA Meeuse

Bibliography: Meeuse, Bothalia 7: 424--425. 1960; Anon., Assoc. Etud. Tax. Fl. Afr. Trop. Index 1960: 60. 1961; G. Taylor, Ind. Kew. Suppl. 13: 109. 1966.

A perennial herb or subshrub, about 50 cm. tall, with a tough base, producing several erect and sparingly branched stems from the woody top of the rootstock; stems more or less distinctly tetragonal, becoming more terete when passing into the inflorescence, rather densely leafy, short-pubescent to hirsutulous with straight or sometimes more or less distinctly uncinate hairs, the nodes marked with a narrow band of longer stiff hairs; leaves decussate-opposite; petioles to 7 mm. long, setulose-hispidulous; leaf-blades apparently rather dark-green above, paler beneath, ovate or ovate-oblong to somewhat hastate-oblong, 2--4.5 cm. long, 1.2--3 cm. wide, obtuse to rounded at the apex, distinctly but usually not very deeply incised-crenate or crenate-serrate along the margins, broadly cuneate to subtruncate at the base and abruptly narrowed into laterally decurrent wings on the petiole, subscabrid on both surfaces with fine setulose-strigose hairs slightly broadened and raised at their base; venation only conspicuous on the lower leaf-surface, indistinct on the upper; midrib rather slender, from which on either side at the base of the blade a usually unequally forked rarely single secondary vein branches off and, higher up, 3--5 usually unforked veins branch off, connected by rather distant more or less parallel tertiary veins oriented perpendicular to the secondary ones; inflorescence a terminal spike-like raceme, 15--25 cm. long, the axis a direct continuation of the stem and with the same type of pubescence; pedicels ultimately 1.5--2 mm. long, dilated at the apex into a flat disk-shaped articulation with the calyx; bractlets lanceolate, 3--4 mm. long, acuminate at the apex, setulose; flowers not seen; fruiting-calyx inflated, nearly closed at the orifice, orbicular in outline, laterally compressed, subvelutinous with short stiff grayish-yellow straight to uncinate setose hairs and sparsely tuberculate with blunt or pungent small protuberances, 7--9 mm. long and wide, 3--4 mm. thick; fruit composed of two dry 2-celled cocci (mericarps); cocci in all about 6 mm. long, 4 mm. wide, and 2.5 mm. thick, spinescent with 1--2 mm. long straight to distinctly curved spines, of a bright golden brown color, covered by a dense pubescence of minute stiff hairs, flat on the commissural surface.

The type of this species was collected by B. de Winter & Leist-

ner (no. 5532) at Kaokoveld, 1.6 km. northeast of Kaoko-Otavi, on the road to Ohopoho, Southwest Africa, and is deposited in the National Herbarium at Pretoria, South Africa.

Meeuse (1960) says "Although flowers are lacking, the plant is clearly a species of Priva, a genus whose species are mostly characterized by fruit characters, the flowers being, apart from differences in size and pubescence, rather uniform in structure. In Moldenke's monograph of the genus.....it would key out as P. curtisiae Kobuski, an East African species, to which it is indeed closely related on account of the cocci being spiny throughout on back and sides and which it also resembles very much in habit, shape and texture of leaves, type of pubescence, 'bearded' stem-nodes, etc. but from which it differs in several respects. The petioles are longer, the fruiting-calyx and cocci are larger and the spines on the cocci longer and more curved than in P. curtisiae, the calyx bears short protuberances (not found in P. curtisiae) and the fruit-cocci, which are flat on the commissural surface (not excavated as in P. curtisiae) are of a striking golden-brown colour, hence the proposed specific epithet. It is possible that more differences will be found once the flowers of P. auricoccea have been collected. Although the differences mentioned may appear rather small, they are not smaller than those between some of the other species of long standing in the genus. In view of the urgency in connection with the preparation of the proposed Flora of South West Africa by the workers of the Botanische Staatssammlung at Munich, the description is not delayed for lack of flowers which, in this genus, are not so important for diagnostic purposes as in most other genera."

Nothing is known to me of this taxon except what is given in the original description.

PRIVA BAHIENSIS P. DC.

Additional bibliography: Jacks. in Hook. f. & Jacks., Ind. Kew. 2: 628. 1894; M. Kunz, Anatom. Untersuch. Verb. 54. 1911; Moldenke, Phytologia 5: 66--67. 1954; Moldenke, Résumé 104, 117, 340, & 467. 1959.

Recent collectors have found this plant in flower in July. Material has been misidentified and distributed in herbaria under the name Tamonea juncea Schau. The Glocker 412 collection, cited below, is a mixture with Stachytarpheta maximiliani Schau.

A cotype of Priva bahiensis, Blanchet 1027, in the Delessert Herbarium at the Conservatoire ey Jardin Botaniques at Geneva, was photographed there by Macbride as his type photograph number 7857.

Additional & emended citations: BRAZIL: Bahia: Blanchet 643 (F--520688), 1027 [Macbride photos 7857] (F--645633--cotype, N--photo of cotype, W--photo of cotype); A. Castellanos 25133 [Herb. Cent. Pesq. Florest. 3902] (Z); Glocker 408-13E (N), 412, in part (Bm); Salzmann 438 (E--118802--cotype). Pernambuco: Pickel 2616 (F--753734, W--1518172). State undetermined: Burchell 4 [Rio] (K).

MOUNTED ILLUSTRATIONS: Kobuski drawing 9 (E—925406), 18 (E—925405).

PRIVA BOLIVIANA Moldenke

Additional bibliography: E. J. Salisb., Ind. Kew. Suppl. 11: 202. 1953; Moldenke, Phytologia 5: 67. 1954; Moldenke, Résumé 114, 117, & 467. 1959; Troncoso, Darwiniana 11: 591—597. 1959.

Illustrations: Troncoso, Darwiniana 11: 592, 594, & 595, fig. 1—3. 1959.

Troncoso (1959) has recently published a greatly amplified description of this species which is worth reproducing here: "Hierba perenne, pubescente, sufrutescente en la base, de 25—40 cm de alt. (—80 cm, según Moldenke), con tallos abajo ramificados, decumbente-ascendentes o suberectos, tetrágonos, suavemente sulcados hacia el ápice. Ramas grácile, densamente pubescentes con pelitos breves uncinados y pocos pelos simples rígidos particularmente sobre las aristas, glabrescentes con la edad. Entrenudos de 2—5 cm de long. Hojas opuestas, membranosas, pecioladas; lámina oval de 1,5—4 cm x 0,8—2,5 cm de long. y lat. respect., subaguda a obtusa, truncada a subtruncada, muy brevemente cuneada en la base, borde crenado, en la base entero, penninervada, nervaduras impresas en el haz, prominentes en el envés, con nervios secundarios divergentes en ángulo agudo, los dos inferiores muy aproximados, pilosa en ambas caras, epifilo con pubescencia uncinada y pelitos híspidos callosos en la base más densos en el borde de la lámina, hipofilo con pelitos uncinados densos y pelos más largos y rígidos particularmente sobre los nervios; pecíolos surcados, de 0,5—1 cm de long. con pubescencia breve uncinada. Inflorescencia racimosa, racimos espiciformes de 4—10 cm de long. (de 8—20 según Moldenke), superando las hojas de su propio nudo, terminales o aparentemente axilares por el crecimiento de vástagos axilares que a su vez terminan en nuevos racimos. Flores distanciadas, alternas; pedicelos muy breves, de 1—1,5 mm de long., pubescentes, erectos; brácteas lineales, pequeñas, de 1,5—2 mm de long., pubescentes; cáliz tubuloso, de 2,5—3,8 mm de long., acrescente en el fruto, ovalado-subinflado, hasta de 6 x 3,5 mm de long. y lat., muchas veces hendido en dos mitades, uncinado-pubescente y con pelos largos, híspidos más ralos sobre los nervios, 5-nervado y 5-dentado, con dientes muy breves, triangulares, 4 subiguales, el anterior más reducido; corola azul-violácea, pequeña, de 5—6 mm de long. bilabiada, el lóbulo anterior más reducido, bilobulado, el posterior trilobulado con el lóbulo medio más desarrollado, lóbulos redondeados, tubo breve apenas sobrepasando el cáliz, pubérulo exteriormente en el tercio superior, con pelitos densos retrorsos en el garganta corolar hasta la inserción de los estambres; estambres 4, didínamos, inclusos, insertos hacia la mitad del tubo corolar, los dos superiores con una glándula conectival sésil, papilosa, rojo-vinosa, del tamaño de una teca (Este carácter de la glándula anteral, bastante común en el género Glandularia y en algunas Lippia, no habia sido observado aún en Priva),

tecas ligeramente divergentes, filamentos breves; estilo incluso, breve; estigma bilobado con el lóbulo anterior estigmatífero ligeramente encorvado y el posterior reducido, subdentado; ovario oval, bicarpelar con fisura central, carpelos 2-ovulados, óvulos erectos fijos en la base. Fruto esquizocárpico, pericarpio maduro de tipo drupáceo-seco, oval-oblongo, de 2,8 x 2,1 x 4—5 mm de lat., gros. y long. respect., glabro, protegido por el cáliz acrescente, membranoso y finalmente hendido; mericarpios 2 de superficie dorsal reticulado-escrobiculada, la ventral cóncava, lisa, recubiertos por un epicarpio membranoso, brevemente dilatado en los bordes, endocarpio endurecido, marcadamente reticulado-escrobiculado dorsalmente y con 4—6 apéndices laterales espinosos con ápice doblado hacia abajo o en forma de T, prolongado en la base en 3—4 púas (solamente el fruto maduro muestra el endocarpio endurecido provisto de apéndices espinosos, en el fruto immaturo es papiráceo y escrobiculado en casi toda su superficie .....), mesocarpio desvanecido dejando pequeñas cavidades entre los apéndices espinosos sobre los cuales está tendido el epicarpio como una delgada membrana seca. Semilla exalbuminada."

Beside the type, she cites Juárez & Burkart 20184 from Formosa, Argentina, deposited in the herbarium of the Instituto Botanica Darwinion at San Isidro, and collected in "montes xerófilos, partes húmedas".

She comments that "Priva boliviana es especie próxima a P. lappulacea (L.) Pers., tipo del género, distinguiéndose netamente por presentar esta última el cáliz tubular-urceolado, subtruncado en el borde, oscuramente 5-apiculado, no costillado y el fruto equinado con cortos apéndices dorsales espinosos y la superficie comisural no marginada."

PRIVA CORDIFOLIA (L. f.) Druce

Emended synonymy: Büchnera cordifolia L. f., Suppl. 287. 1781. Streptium asperum Roxb., Pl. Corom. 2: 25, pl. 146. 1798. Tortula aspera Roxb. ex Willd., Sp. Pl. 3: 359. 1801. Verbena forskaelaei Vahl ex Rottl., Gesell. Naturforsch. Freunde Berlin, Neue Schrift, 4: 222. 1803. Priva leptostachya A. L. Juss., Ann. Mus. Nat. Hist. Nat. Paris 7: 70. 1806 [not P. leptostachya Auct., 1962]. Buchnera cordifolia L. f. apud Jacks. in Hook. f. & Jacks., Ind. Kew. 1: 350. 1893. Priva cordifolia Druce apud A. W. Hill, Ind. Kew. Suppl. 6: 166. 1926. Verbena aspera Hügel ex Moldenke in Fedde, Repert. Spec. Nov. 41: 42, in syn. 1936. Buechnera cordifolia L. f. ex Moldenke in Fedde, Repert. Spec. Nov. 41: 42, in syn. 1936. Tertula aspera "Roxb. ex Willd." apud Brenan, Mem. N. Y. Bot. Gard. 9: 37, sphalm., in syn. 1954.

Additional & emended bibliography: A. L. Juss., Ann. Mus. Nat. Hist. Nat. Paris 7: 70. 1806; Steud., Nom. Bot., ed. 2, 2: 397 & 750. 1841; Bocq., Adansonia 3: [Rev. Verbenac.] 212. 1863; Jacks. in Hook. f. & Jacks., Ind. Kew. 2: 628. 1894; Gürke in Engl., Pfl. Ost-Afr. C: 338. 1895; J. G. Baker in Thiselt.-Dyer, Fl. Trop.

Afr. 5: 285. 1900; M. Kunz, Anatom. Untersuch. Verb. 55. 1911; Gamble, Fl. Madras 1091. 1924; A. W. Hill, Ind. Kew. Suppl. 6: 166. 1926; Moldenke, Phytologia 5: 67—68. 1954; Brenan, Mem. N. Y. Bot. Gard. 9: 37. 1954; Moldenke in Humbert, Fl. Madag. 174: 30—33. 1956; Sebastine, Bull. Bot. Surv. Ind. 1: 95. 1959; Moldenke, Résumé 158--160, 164, 166, 167, 222, 240, 340, 350, 355, 358, 364, & 467. 1959; Cuf., Bull. Jard. Bot. Brux. 32: Suppl. 794. 1962; Nair & Rehman, Bull. Nat. Bot. Gard. Lucknow 76: 8, 9, & 23, fig. 14 a & b, pl. 1, fig. 4. 1962; Moldenke, Phytologia 9: 40 & 44. 1963; Punt, Reg. Veg. 36: 18. 1964.

Illustrations: Roxb., Pl. Corom. 2: pl. 146. 1798; Nair & Rehman, Bull. Nat. Bot. Gard. Lucknow 76: 9, fig. 14 a & b, pl. 1, fig. 4. 1962.

Barnes found this plant in flower and fruit in June. Nair & Rehman (1962) cite Nat. Bot. Gard. 12626, slide 2736, and describe the pollen as follows: "3-zonicolporate, subprolate (47 x 42 μ). Extocolpium slightly constricted in the middle, ends slightly rounded, margin slightly wavy. Exine thinner and forms a groove around the colpus marking a pseudocolpus, as in Verbena. Apocolpium diameter 14 μ. Endocolpium lalongate (3.5 x 14 μ), dumbel-shaped being narrower in the middle and broader at the lateral ends. Exine 4.2 μ thick. Ectine almost as thick as endine, granulate, adjacent granules uniting irregularly. Columella clear."

Steudel (1841) gives Verbena forskohlei Herb. Madrid. as a synonym of what he calls Priva leptostachya, but this horticultural name actually belongs in the synonymy of P. adhaerens (Forsk.) Chiov. Sebastine (1959) cites his no. 1443 from India.

The Pappi 5155, distributed as P. cordifolia, is actually var. abyssinica (Jaub. & Spach) Moldenke.

Additional & emended citations: INDIA: Coimbatore: Narayana 1929 (Bi). Madras: E. Barnes 1004 (G). Mysore: Ramaswany 904 (Z). Punjab: J. R. Drummond 26708 (Ca--2446646). State undetermined: Wallich s.n. [Ind. orient.] (E--11987⅓).

PRIVA CORDIFOLIA var. ABYSSINICA (Jaub. & Spach) Moldenke

Emended synonymy: Priva abyssinica Jaub. & Spach, Ill. Pl. Orient. 5: [57]—58, pl. 453 & 454. 1856. Priva abessinica Jaub. & Spach ex Briq. in Engl. & Prantl, Nat. Pflanzenfam. 4 (3a): 153, fig. 59E, sphalm. 1895.

Additional bibliography: Bocq., Adansonia 3: [Rev. Verbenac.] 212. 1863; Aschers. in G. Schweinf., Beitr. Fl. Aethiop. 278. 1867; Franchet, Sert. Somal. 50. 1882; Jacks. in Hook. f. & Jacks., Ind. Kew. 2: 628. 1894; Moldenke, Phytologia 5: 68—70. 1954; Brenan, Mem. N. Y. Bot. Gard. 9: 37. 1954; Moldenke in Humbert, Fl. Madag. 174: 30—33. 1956; Moldenke, Résumé 133—135, 143, 145, 146, 149—151, 154, 156, 158, 340, & 467. 1959; Cuf., Bull. Jard. Bot. Brux. 32: Suppl. 794. 1962.

Illustrations: Jaub. & Spach, Ill. Pl. Orient. 5: pl. 453 & 454. 1856; Briq. in Engl. & Prantl, Nat. Pflanzenfam. 4 (3a): 153,

fig. 59E. 1895.

Recent collectors describe this variety as herbaceous, erect, 2--3 feet tall, wide-spreading, the stems hollow, square, leaves pubescent, sparse, sap colorless, and calyx inflated, covered with viscid glandular hairs, growing in hard stony soil among rocks, in strand association with trees and shrubs on the inner beach, and in lowveld bush on riverbanks, at altitudes from sea-level to 1000 meters, flowering in February and July, fruiting in May.

The flowers are described as "light-blue" on Rodin 4158, "purple with white center" on Tanner 838, "pale-mauve, small" on L. E. Codd 5249, "pale-violet" on Humbert 14593, and "white" on A. Peter 30334 & 42238.

Franchet (1882) records the plant from French Somaliland. Material has been misidentified and distributed in herbaria under the names P. leptostachya A. L. Juss. and P. meyeri Jaub. & Spach. On the other hand, the Mearns 2086, distributed as this variety, is actually P. curtisiae Kobuski.

Additional & emended citations: ERITREA: Pappi 3873 (W--1969158), 5155 (W--1969209). UGANDA: Dümmer 30 (W--633415); Mearns 2402 (W--632375). TANGANYIKA: A. Peter 41007 [V.256] (B), 42238 [V.282] (B); Tanner 838 (Ca--132996), 1890 (B, S). KENYA: Dümmer 4611 (W--1029976). MALAWI: J. Buchanan 887 (W--807175). PORTUGUESE EAST AFRICA: Lourenzo Marques: Rodin 4158 (Ca--802171); E. Sousa 5 (Ul). Mozambique: Howard 118 (W--554445). SOUTH AFRICA: Natal: Humbert 14593 (B); A. Peter 30334 [V.11] (B). Transvaal: L. E. Codd 5249 (Z). MOUNTED ILLUSTRATIONS: Kobuski drawing 8 (E--925406), 17 (E--925405); Ostenmeyer drawing 153 (V).

PRIVA CORDIFOLIA var. AUSTRALIS Moldenke

Additional bibliography: Moldenke, Phytologia 5: 70--71. 1954; Moldenke, Résumé 154 & 467. 1959.

The Meeuse 9123 & 9216, Breyer s.n. [II.1918], and Van Dam s.n. [III.1920] cited in Phytologia 5: 71 (1954) — the first two as in the H. N. Moldenke herbarium and the last two as in the Britton Herbarium -- are actually now in the Delessert Herbarium at the Conservatoire et Jardin Botaniques in Geneva.

Recent collectors have found this plant growing at 35 meters altitude and record the vernacular name "chinamene". The flowers on Torre & Paiva 9125 are described as "white".

Additional citations: PORTUGUESE EAST AFRICA: Lourenzo Marques: Grandvaux Barbosa & Lemos 7869 (Ul); Torre 7535 (Ul). Manica e Sofala: Torre & Paiva 9125 (Ul).

PRIVA CORDIFOLIA var. FLABELLIFORMIS Moldenke

Additional bibliography: Moldenke, Phytologia 5: 71. 1954; Brenan, Mem. N. Y. Bot. Gard. 9: 37. 1954; Moldenke, Résumé 142, 143, 145, 149--151, & 468. 1959.

Brenan (1954) places in synonymy under this variety "Priva leptostachya Juss. Ann. Mus. Hist. Nat. Paris 7: 70. 1806, nom. illegit. cum syn. Tertula aspera Roxb. ex Willd.; Bak. in Thiselton-Dyer, Fl. Trop. Afr. 5: 285. 1900, pro parte".

Recent collectors have found this plant growing in marshy meadows, at altitudes from 280 to 1290 meters, and describe it as an herb or bushy plant, 1—2 m. tall, rather spreading, with pendent flowers, blooming and fruiting in August and December. The flowers on A. Peter 10242 & 30469 and on H. G. Faulkner 1269 are described as "white", but on H. G. Faulkner 112 as "pale-pink". Schlieben refers to the plant as "abundant".

Additional citations: TANGANYIKA: Drummond & Hemsley 2413 (S); H. G. Faulkner 1269 (B, S); A. Peter 7542 [O.II.125] (B), 7988 [O.III.19] (B), 10242 [O.III.94] (B), 12475 [O.III.154] (B), 12513 [O.III.156 bis] (B), 12726 [O.III.161] (B), 13213 [O.III.171] (B), 15707 [O.IV.18] (B), 17314 [O.IV.80] (B), 18546 [O.IV.126] (B), 23453 [O.IV.300] (B), 24419 [O.IV.329] (B), 39993 [V.221] (B), 51790 [O.IV.9] (B); Schlieben 1576 (B). RHODESIA: A. Peter 51217 [S.58] (B). PORTUGUESE EAST AFRICA: Mozambique: A. Peter 30469 [V.16] (B). Quelimane: H. G. Faulkner 112 (S).

PRIVA CURTISIAE Kobuski

Additional synonymy: Priva bellinii Chiov., Racc. Bot. Miss. Consol. Kenya 98, in syn. 1935.

Additional bibliography: Chiov., Racc. Bot. Miss. Consol. Kenya 98. 1935; A. W. Hill, Ind. Kew. Suppl. 8: 194 (1933) and 9: 223. 1938; Moldenke, Phytologia 5: 71—72. 1954; Moldenke, Résumé 145, 146, & 468. 1959; Cuf., Bull. Jard. Bot. Brux. 32: Suppl. 795. 1962.

Recent collectors have found this plant growing in grasslands and along trails, from sea-level to 5000 feet altitude, flowering in May, July, August, and November, and fruiting in November. The flowers on Bogdan 352 are described as "pink", while on A. Peter 12321 they were "white". Material has been misidentified and distributed in herbaria as P. cordifolia var. abyssinica (Jaub. & Spach) Moldenke and as "Malvaceae?"

Additional & emended citations: KENYA: Bogdan 352 (Ca—984042); A. G. Curtis 499 (E—925409—isotype, E—925404—drawing & photo of type); Kearns 2086 (W—632051). TANGANYIKA: A. Peter 11744 [O.III.129] (B), 12321 [O.III.149] (B), 15368 (B), 46863 [V.314] (B).

PRIVA DOMINGENSIS Urb.

Additional bibliography: Prain, Ind. Kew. Suppl. 5: 207. 1921; Moldenke, Phytologia 5: 72. 1954; Moldenke, Résumé 57 & 468. 1959.

This species is known to ascend to an altitude of at least 800 meters in the Dominican Republic.

Emended citations: HISPANIOLA: Dominican Republic: Ekman H. 5842 (W—1410114); Valeur 186 (W—1414656). Haiti: Leonard & Leon-

ard 12775 (Ca--440448), 13037 (W--1451726), 13597 (W--1452228), 13795 (E--992257, W--1452388).

PRIVA GRANDIFLORA (Ort.) Moldenke

Additional synonymy: Priva rhinanthifolia B. L. Robinson apud A. W. Hill, Ind. Kew. Suppl. 8: 194. 1933. Priva grandiflora Moldenke ex J. Rzedowski, Anal. Esc. Nac. Cienc. Biol. 8: 105. 1954. Priva rhinanthifolia (M. & G.) Greenm., in herb.

Additional bibliography: Walp., Repert. 6: 687. 1847; Jacks. in Hook. f. & Jacks., Ind. Kew. 2: 628. 1894; M. Kunz, Anatom. Untersuch. Verb. 55. 1911; Perry, Ann. Mo. Bot. Gard. 20: 342 & 355. 1933; A. W. Hill, Ind. Kew. Suppl. 8: 194. 1933; Schnack, Anal. Inst. Fitotéc. Sta. Catalina 4: 18. 1942; Schnack & Covas, Darwiniana 6: 471. 1944; Darlington & Janaki Ammal, Chromosome Atl. 270. 1945; E. J. Salisb., Ind. Kew. Suppl. 11: 202. 1953; J. Rzedowski, Anal. Esc. Nac. Cienc. Biol. 8: 105. 1954; Moldenke, Phytologia 5: 72--73 (1954) and 6: 239. 1958; Moldenke, Résumé 38, 222, 340, 341, 355, 365, 373, 377, & 468. 1959; Moldenke, Phytologia 8: 183, 427, & 441 (1962) and 9: 307 & 315. 1963.

Recent collectors have found this plant growing in grass by cornfields, in grasslands with scattered pines or stony outcrops, in roadside ditches through the desert, in pedregal, and in dry rocky level grazed Acacia-Hilaria-Aristida-Opuntia grasslands with many herbs like Calochortus, Ruellia, Oxalis, Artemisia, Salvia, Mimulus, etc.; also on stony hillsides, mesquite-nopal savannas, gentle slopes on reddish sandy loam, and flat mountain tops, and "under oaken hills", at altitudes of 2000 to 2665 meters. Hinton describes the plant as "procumbent", while Waterfall notes "roots fascicled".

The corolla is described as "pale-lavender and white blotched" on Weintraub & Roller 173, "lavender" on Hinton 13204, "light-pink" on Waterfall 13400, and "pale-bluish, nearly white" on R. McVaugh 18278. Schnack & Covas (1944) report the chromosome number as 2n = 10.

Material has been misidentified and distributed in herbaria as Acalypha sp., Valerianodes sp., and Verbena sp.

Additional & emended citations: MEXICO: Aguascalientes: R. Mc Vaugh 18278 (Mi); J. Rzedowski 14011 (Ip). Chihuahua: Goldman 103 (W--335602); LeSueur Mex.95 (Ca--712708, W--1887830); Pringle 1549 (Ca--104892), 3057 (Gg--421280, N, W--2296417). Durango: M. C. Johnston 2664 (Au--231742, Mi); E. W. Nelson 4635 (W--332688); Edw. Palmer 396 (Ca--145887, E--118806, W--571421), 424 (Ca--139738, E--118770, E--118771, W--304369); Waterfall 13400 (Gg), 13476 (Gg), 15433 (Gg), 16158 (Ca); Waterfall & Wallis 13358a (St), 13400 (St), 13476 (St, W--2297161), 13539 (St). Federal District: Balls B. 4923 (Ca--684128), B.5665 (Ca--683963); Orcutt s.n. [Olivar] (F--281902); Rose, Painter, & Rose 8511 (W--452003), 9496 (W--452987). Hidalgo: Mexia 2743 (E--689775, E--1023108); Salazar s.n. [Nopala,

Aug. 1, 1913] (W—1169845). Jalisco: J. N. Rose 3576 (W—302553); Weintraub & Roller 173 (Mi). México: Bourgeau 357 (W—209558); Galván s.n. [23.VI.1963] (Ip); Paray 563 (Ip), 2957 (Ip); Rose, Painter, & Rose 8422 (W—451916); Salazar s.n. [Teoloyucan, Aug. 11, 1913] (W—1013206, W—1169846). Michoacán: Arsène 3499 (W—1003701), 8296 (E—841342, W—1003669); Hinton 13204 (Mi, Rf, Ur, W—1891048); Iltis, Koeppen, & Iltis 530 (S); Pringle 4147 (Ca—25126, E—118769, Mm—15406, W—57689, W—1418001). CULTIVATED: Germany: Herb. Bernhardi s.n. [Hanover] (E—118048). MOUNTED ILLUSTRATIONS: Kobuski drawing 13 (E—925406), 22 (E—925405).

PRIVA HUMBERTI Moldenke

Additional bibliography: Moldenke, Phytologia 5: 73. 1954; Moldenke in Humbert, Fl. Madag. 174: 28—29. 1956; Moldenke, Résumé 156 & 468. 1959; G. Taylor, Ind. Kew. Suppl. 12: 114. 1959.

PRIVA LACINIATA Moldenke

Additional bibliography: Hill & Salisb., Ind. Kew. Suppl. 10: 184. 1947; Moldenke, Résumé 64 & 468. 1959.

PRIVA LAPPULACEA (L.) Pers.

Additional & emended synonymy: Priva echinata A. L. Juss., Ann. Mus. Nat. Hist. Nat. Paris 7: 69. 1806. Verbena tetrandra, calyc. subrotundis erectiusc., sem. echinatis L. apud H. E. Richter, Cod. Bot. Linn. 35. 1835. Blairia Houst. apud H. E. Richter, Cod. Bot. Linn. 35, in syn. 1835. Scorodonia floribus spicatis purpurascentibus pentapetaloidibus Sloane apud H. E. Richter, Cod. Bot. Linn. 35, in syn. 1835. Priva lappulacea Pers. ex Benth., Bot. Voy. Sulphur 152. 1846. Priva lapulacea L. ex Patermann, Beitr. Zytol. Verbenac. 23 & 24, sphalm. 1935. Blairia "Houst. ex Adans." apud G. Taylor, Ind. Kew. Suppl. 13: 149, in syn. 1966. Privia lappulacea (L.) Pers., in herb.

Additional & emended bibliography: L., Syst. Nat., ed. 10, 852. 1759; Adans., Fam. Pl. 2: 198. 1763; Jacq., Obs. Bot. 1: 37, pl. 24. 1764; J. A. Murr. in L., Syst. Veg., ed. 13, 62. 1774; Christm. & Panzer, Vollst. Pflanzensyst. Houttuyn 5: 124. 1779; Jacq., Select. Stirp. Amer. Hist. Picta pl. 9. 1780; Willd., Sp. Pl. 1: 118. 1797; J. Sm. in Rees, Cycl. 36: no. 13. 1817; H. E. Richter, Cod. Bot. Linn. 35. 1835; Peterm., Cod. Bot. Linn. Ind. Alph. 196. 1840; Steud., Nom. Bot., ed. 2, 2: 397 & 750. 1841; Benth., Bot. Voy. Sulphur 152. 1846; Griseb., Abhand. Königg. Gesell. Wissen. Götting. 7: 255. 1857; Bocq., Adansonia 3: [Rev. Verbenac.] 212. 1863; Griseb., Cat. Pl. Cuba 214. 1866; A. Gray, Syn. Fl. N. Am. 2 (1): 334. 1878; A. S. Hitchc., Ann. Rep. Mo. Bot. Gard. 4: 117. 1893; Jacks. in Hook. f. & Jacks., Ind. Kew. 2: 628. 1894; Just, Bot. Jahresber. 23 (2): 47, 76, & 595. 1897; M. Kunz, Anatom. Untersuch. Verb. 54 & 55. 1911; A. Stewart, Proc. Calif. Acad. Sci., ser. 4, 1: 134. 1911; Guillaumin, Ann. Mus. Colon. Marseille 9: 206. 1911;

Loes., Verh. Bot. Ver. Brand. 53: 80 [Abhandl. 245]. 1912; Stapf, Ind. Lond. 6: 430. 1931; Schwenke, Zytol. Untersuch. Verbenac. 23—26 & 43. 1931; Patermann, Beitr. Zytol. Verbenac. 23—25, 43, 48, [54], & [56], pl. 2, fig. 15—17, & pl. 5, fig. 5. 1935; Robledo, Lecc. Bot. 2: 499. 1940; E. J. Salisb., Ind. Kew. Suppl. 10: 33. 1947; Bravo Hollis & Ramirez Cantu, Anal. Inst. Biol. Mex. 22: 421. 1951; Asprey & Robbins, Ecol. Monog. 23: 411. 1953; Moldenke, Phytologia 5: 95 & 105—106. 1954; Darlington & Wylie, Chromosome Atl., pr. 1, 323. 1955; Moldenke, Mem. N. Y. Bot. Gard. 9: 177. 1955; Bravo Hollis, Anal. Inst. Biol. Mex. 26: 297. 1955; Moldenke, Verb. 16—17. 1955; Alain in León & Alain, Fl. Cuba 4: 302, fig. 130a. 1957; B. H. Johnson, Wasmann Journ. Biol. 16: 295. 1958; Moldenke, Résumé 13, 28, 38, 40, 42—45, 47—50, 52, 54, 55, 57—64, 68, 73, 76—78, 80, 81, 84, 104, 114, 190, 222, 237, 238, 240, 340, 343, 353, 355, 364, 366, 368—370, 378, 394, & 468. 1959; Darlington & Wylie, Chromosome Atl., pr. 2, 323. 1961; Hepper in Hutchinson & Dalz., Fl. W. Trop. Afr., ed. 2, 2: 434—435. 1963; Moldenke in Shreve & Wiggins, Veg. & Fl. Son. Des. 2: 1257. 1964; Moldenke, Résumé Suppl. 11: 8. 1964; Gooding, Loveless, & Proctor, Fl. Barbados 362—363 & 481. 1965; Backer & Bakh., Fl. Java 2: 599. 1965; G. Taylor, Ind. Kew. Suppl. 13: 18 & 149. 1966.

Additional illustrations: Jacq., Obs. Bot. 1: 37, pl. 24. 1764; Jacq., Select. Stirp. Amer. Hist. Picta pl. 9. 1780; Patermann, Beitr. Zytol. Verbenac. pl. 2, fig. 15—17, & pl. 5, fig. 5. 1935; Alain in León & Alain, Fl. Cuba 4: fig. 130a. 1957.

Recent collectors describe this plant as an annual or perennial herb, erect or decumbent, to 1 m. tall, with a large taproot, small or minute flowers, the calyx green and inflated, the anthers yellow or pale-yellow to tan or brown or even white, the stigmas yellowish, the ovary green, and the fruits green, 4-partite, and very adhesive. The flowers are described as "purple" on Herald & Clark 406 and Hinton 16120, "light-purple" on H. H. Bartlett 12162 and J. V. Santos 2221, "purplish" on Abbott 429, "pale-purple" on Woytkowski 5618, "purple-lavender, white-streaked in throat & on lobes" on B. L. Turner 2100, "violet" on Hinton 1967, "pale-violet" on Molina R. 263, "light-violet, 8.5 p 4/9 on Munsell system per Nickerson color fan" on Straw & Forman 1838, "lavender" on Correll & Schweinfurth 15651 and Wiggins & Rollins 396, "pale-lavender" on I. L. Wiggins 18628, "pale-mauve" on Purseglove P.6221, "blue" on Breedlove 7670, Breedlove & Raven 13347, C. L. Lundell 12466, and Yuncker 17028, "pale-blue" on Asplund 15373, Breedlove 11793, J. B. Hall 2517, Irwin R.117, and Morton 5441, "pink" on Glassman 1715 and Koelz 34220, "crimson" on Mexia 364 1/2, "light-blue with white center" on Wilbur & Wilbur 1569, "white" on Goll 28, Herald & Clark 339, Hinton 1229, R. M. King 741, D. A. Lima 53-1294, Morley 794, Ryan & Floyed 79, Tucker 501, Wedel 2834, Worth, Morrison, & Horton 8611, and Woytkowski 5617, and "tube white, petals light-violet" on Crosby,

Hespenheide, & Anderson 95.

This is a widespread species, found from southern Florida and southeastern Texas through the West Indies and Central America south to eastern Peru and Bolivia; introduced in Java and Ghana; occasionally cultivated elsewhere.

Recent collectors have found it growing in shaded areas, open or flat grazed areas, in loam soil, clay, or silty-clay soil, in alpine meadows, dry arroyos, pedregal, Prosopis brush, fields, barrancas, secondary matorral, and in dense woods composed of woody Mimosaceae, Cereus-type cacti, araliads, etc., 6—10 m. tall, along or near roadsides, sandy roadsides, and stream bottoms in shady canyons, bordering thickets, and adjacent to ditches, as well as on dry slopes and in coffee plantations, from near sea-level to 1600 meters altitude.

Schwenke (1931) reports the haploid chromosome number as 6. Additional common names reported for the plant are "bur vervain" and "farolito". It has been collected on clay flats, open rocky clay hillsides, wooded slopes, wooded creek banks, cliffs, shaded sandy slopes and steep northeast slopes among rocky outcrops, in rocky clay soil, rocky clay-loam, volcanic soil with humus, wet alluvial clay, calcareous clay-loam, and limey soil with rocks, in deep or partial shade, woods, waste land, hedgerows around fields, swamps in low wet palm areas, pastures, varied short brush on hills, and in sand and limestone rocks in the mountains.

Worth, Morrison, & Horton describe the style as "gynobasic", which is a characteristic of the Lamiaceae. Herald & Clark refer to the plant as a "1 ft. subwoody herb" and say that its habitat is "riparian"; Wedel calls it a "shrub 2 1/2 ft. tall" and Chagas refers to it as "arbusto" 1 m. tall. These are all probably errors in observation. Crosby, Hespenheide, & Anderson report the species as "common" in Jamaica, where Yuncker refers to it as a "waste area weed". My son, Andrew R. Moldenke, reports it to be a "common weed" in Costa Rica. The Wilburs refer to it as "very common in disturbed areas" in Jalisco; King reports it as both "uncommon" in shaded areas and in partial shade, "common" "growing in gravelly loam in open sun", "occasional in open sun", and "uncommon" in Oaxaca. Feddema describes it as "occasional in sandy loam, partial shade, of old fields and hedgerows" in Nayarit; Ryan & Floyed found it "abundant" in Guerrero; Graham & Johnston call it an "infrequent annual weed" or even "very rare" in Tamaulipas; Sauer found it "behind spray zone on broken limestone coralline bench" in Jamaica; while Correll & Johnston report "only a couple of plants seen, RARE, at edge of road in palm hammock" in Cameron County, Texas. On the Galapagos Islands it is said to grow in the Scalesia zone and in dense jungles of the Upper Transition zone with Pisonia trees.

In Shreve & Wiggins (1964) the distribution of this species is given as "In thickets and weedy flats, along small arroyos, and on canyon floors; common as a weed in clearings and along streets, Sonoran to Tropical zones, from Florida and Texas through the West Indies, Mexico, and Central America to Peru, Brazil, and Bolivia;

naturalized in Java. Occurring in the Sonoran Desert near Matapé, about 40 miles northeast of Hermosillo, Sonora."

Hepper (1963) calls the plant "A perennial weed with spreading and decumbent or erect stems, markedly 4-angled; flowers small, the corolla violet with paler stripes." He cites Hall 1891 from Asebu, near Cape coast, in Ghana, and notes "A native of the warmer parts of America and the West Indies; introduced into Java and possibly elsewhere, but not previously recorded from Africa." Backer & Bakhuizen van den Brink (1965) affirm that it is truly naturalized near Bantur, Java, flowering there all through the year, along roadsides at about 300 meters altitude, and that "In detached branches the corolla is very easily shed (traumatochory); when the fruit is mature the calyx (with the enclosed fruit) comes off from the persistent pedicel and easily clings to passing objects by the aid of upcurved bristles."

The description of this plant by Linnaeus, as given by J. A. Murray (1774), is worth repeating here:

lappulacea. 7. V. tetrandra, calyc. subrotundis erectiusculis, sem. echinatis. Jacq. obs. 37, t. 24. Burseria Loefl. it. 194. n. 69. Semina bilocularia sunt.

In the Linnean Herbarium, under genus 35, Verbena, specimen number "5" is labeled "lappulacea" in the handwriting of Solander and bears the notation "Br". It is definitely what we now understand as Priva lappulacea (L.) Pers. Specimen number "6", pinned to number "5", is labeled "lappulacea" in Linnaeus' own handwriting and also bears the notation "Br." [=Browne] and "Rolander" [Rolander collected in Surinam after 1754]. It is Salvia occidentalis Sw. in the Lamiaceae.

It should be noted here that the C. Junge 2993 collection, cited below, bears a label inscribed "PLANTS OF CHILE", but was actually collected in the Dominican Republic!

Material of Priva lappulacea has been misidentified and distributed in herbaria as P. aspera H.B.K. and as P. mexicana (L.) Pers. On the other hand, the Tucker 786, distributed as P. lappulacea, is actually P. aspera H.B.K.; F. W. Gould 10810 is P. mexicana (L.) Pers.; W. Schumann 1081 is Aloysia gratissima (Gill. & Hook.) Troncoso; and J. Rzedowski 19977 and I. L. Wiggins 18810 are probably mints.

Additional & emended citations: FLORIDA: Monroe Co.: Blodgett s.n. [Key West] (W—43516); Duckett s.n. [June 17, 1930] (W—1485601); Garber s.n. [Key West, Aug. 1877] (W—43518); H. N. Moldenke 614 (E—1002894, W—1581810); Edw. Palmer 395 (E—118768, F—266379, W—43517); Rugel s.n. [Florida, 1842-1849] (E—116954, W—512596). TEXAS: Cameron Co.: Correll & Johnston 17948 (Rf); C. L. Lundell 12466 (Rf); R. Runyon 562 (W—1243499). Hidalgo Co.: Correll & Schweinfurth 15651 (Rf). MEXICO: Baja California: T. S. Brandegee s.n. [Corral Piedra] (Ca—104890), s.n. [San José del

Cabo] (Ca--104891, W--40072). Campeche: Goldman 458 (W--396821); C. L. Lundell 883 (Ca--486969, E--1017041, F--700492, W--1494515); C. D. Mell 2061 (W--1588308). Chiapas: Breedlove 7670 (Du--508668), 11793 (Rf); Breedlove & Raven 13347 (Ac). Colima: P. Goldsmith 89 (Ca--923500, Du--349897); Koelz 34220 (Mi); Edw. Palmer 1007 (W--209151); Worth, Morrison, & Horton 8611 (Ca--643505). Guerrero: R. Q. Abbott 429 (Ip); Barkley, Webster, & Paxson 17M739 (Au--123212, Au--209670); Herald & Clark 339 (Mi), 406 (Mi); Hinton 10545 (Rf), 10573 (Rf), 14391 (Rf); Lyonnet 483 (W--1034282); Edw. Palmer 551 (Ca--167893, E--118781, W--267026); Parsy 3039 (Ip); Rose, Painter, & Rose 9419 (W--452907); Ryan & Floyed 79 (Mi); Willis & Crisman 239 (Mi). Hidalgo: Lundell & Lundell 12382 (Rf). Jalisco: Wilbur & Wilbur 1569 (Mi). México: Hinton 4360 (Rf); Ortonburger, Paxson, & Barkley 16M816 (Ca--763400, N). Michoacán: Hinton 12224 (Mi), 13062 (Mi, Rf, Ur), 13941 (Rf, Ur), 13970 (Rf), 13975 (Rf), 16120 (Ca--97622, Mi, N); B. L. Turner 2100 (Mi). Nayarit: Feddema 529 (Mi); Ferris 5643 (W--1269091). Oaxaca: R. M. King 741 (Mi), 1229 (W--2301501), 1751 (Au--183486, Mi, N, W--2301521), 1967 (W--2301525), 1995 (Au, Mi, W--2301527); Martínez-Calderón 227 (Rf). Quintana Roo: G. F. Gaumer 1702 (B, E--952970, F--58500, W--1267414), 1702 bis (D--658347). San Luis Potosí: J. Rzedowski 10366 (Ip). Sinaloa: T. S. Brandegee s.n. [Culiacan] (Ca--104893, W--873701); Gonzalez Ortega 4220 (W--1083506), 6429 (D--651101), 6758 (F--709231); Mexia 364 1/2 (Ca--367533, E--966856); Nervaez Montes & Salazar 389 (W--1035275); Edw. Palmer 1458 (Ca--770289, F--707669), X, in part (W--305280); J. N. Rose 1722 (W--300588), 3240 (W--302205); Rose, Standley, & Russell 13371 (W--636195), 13711 (W--636540); J. Rzedowski 16547 (Ip); Straw & Forman 1838 (Mi). Sonora: Wiggins & Rollins 396 (Mi); Edw. Palmer 745 (W--57692). Tabasco: Rovirosa 531 (Ca--251125, W--1323167). Tamaulipas: Graham & Johnston 4681h (Au--174345), 4683a (Au--174698, Mi); Edw. Palmer 8 (E--777475, W--462944), 502 (W--572731). Vera Cruz: Barkley, Rowell, & Webster 2640 (Au--123208); Mohr s.n. (W--771822); Orcutt 2999 (E--118809, F--279058); Purpus 2099 (Ca--139743); J. V. Santos 2221 (Mi). Yucatán: G. F. Gaumer 364, in part (E--118779, F--36167, W--268669), 394, in part (F--36197), 24029 (F--552031, W--1268127), s.n. [Izamal, 1888] (F--181636), s.n. [Buena Vista] (F--187330); Gaumer & sons 1702 (Ca--446012); C. F. Millspaugh 1548 (F--61548); Schott 22 (F--40020), 23 (F--40021); Seler & Seler 3995 (F--144544). GUATEMALA: Alta Verapaz: Goll 28 (W--2215787); H. Johnson 211 (W--1081323). El Petén: H. H. Bartlett 12162 (Du--353971, F--714005); Contreras 932 (Ld); C. L. Lundell 3693 (F--688427, F--689469), 15343 (Ld); J. A. Steyermark 46287

(Mi, Rf). Escuintla: Rojas 77 (W--1166665). Izabal: Greenman & Greenman 5978 (E--908315); P. C. Standley 23762 (W--1139437), 24635 (W--1150256), 24795 (W--1150413). Santa Rosa: Heyde & Lux 3017 (W--57691, W--1323161). Sololá: Shannon 247 (W--43507, W--1323166). BRITISH HONDURAS: Gentle 174 (F--713008); Karling 42 (F--599844, W--1406569); C. L. Lundell 79 (F--597989), 363 (F--712069); W. C. Meyer 139 (F--713297); Schipp 845 (Ca--481631, E--1020212, F--712431). HONDURAS: Atlántida: Severen 25 (W--1168299); P. C. Standley 53649 (W--1407865). Cortés: Thieme 775 [J. D. Smith 5613] (W--1323165). La Union: Morrison & Beetle 8770 (Ca--643529). Morazán: Glassman 1715 (N, Ok, Ur); Molina R. 263 (Ca--792806). EL SALVADOR: Ahuachapán: P. C. Standley 19749 (W--1135644). La Libertad: P. C. Standley 23339 (W--1139028). Morazán: Tucker 501 (Ca--1000902, Mi, N, Rf, Vi). San Miguel: P. C. Standley 21114 (W--1136927). San Salvador: Calderón 917 (W--1151880); Renson 146 (W--576119); Velasco 8854 (W--829126, W--1323156). Sonsonate: P. C. Standley 21905 (W--1137660), 22003 (W--1137758), 22097 (W--1137846). NICARAGUA: Chinandega: C. F. Baker 754 (W--862823); Maxon, Harvey, & Valentine 7106 (W--1180820). Grenada: C. F. Baker 166 (Ca--199144, E--808110), 619 (W--862715); Maxon, Harvey, & Valentine 7601 (W--1181311). Managua: Artemio 49 (W--1206387); Chaves 310 (F--599800); Maxon, Harvey, & Valentine 7329 (W--1181041); Morley 744 (Ca--756782); René 66 (W--1209830). COSTA RICA: Alajuela: A. R. Moldenke 1204 (Rf). Guanacaste: A. R. Moldenke 1215 (Ac). Limón: United Fruit Co. 71 (W--861477). Puntarenas: J. A. Echeverria 4184 (Ca--776244); A. R. Moldenke 1219 (Ac), 1321 (Ac). San José: A. R. Moldenke 1200 (Rf). Province undetermined: Rowlee & Rowlee 505 (W--1036486). PANAMA: Bocas del Toro: Carleton 147 (W--1080906); C. P. Cooper 129 (F--579557); Dunlap 193 (W--1205126); H. von Wedel 2834 (Mi). Canal Zone: Duke s.n. [Sept. 26, 1961] (E); P. C. Standley 26473 (W--1217023), 27157 (W--1217427). Panamá: R. Killip 12003 (W--1167139); P. C. Standley 28916 (W--1218387); R. S. Williams 1032 (W--678365). PEARL ISLANDS: Killip 3178 (W--863165); H. Pittier 3560 (W--678616); P. C. Standley 27031 (W--1217340), 27917 (W--1127844). BAHAMA ISLANDS: Andros: Small & Carter 8928 (W--758229). Eleuthera: Britton & Millspaugh 5534 (N); A. S. Hitchcock s.n. [11-18-90] (E--120202). Green Turtle: Brace 1482 (N). New Providence: Brace 23 (F--248455), 95 (N), 483 (K); Britton & Brace 534 (N), 655 (N); Curtis 24 (E--118787, W--428524); Earle 12 (N); A. E. Wight 40 (F--225221, N). Parrot: Millspaugh & Millspaugh 9196 (N). Watling: Britton & Millspaugh 6166 (N). Island undetermined: A. S. Hitchcock s.n. [12-3-90]

(E--46910). CUBA: Havana: León s.n. [15-5-1909] (Vi), s.n. (Vi--4027); Van Hermann 113 (E--969555, F--170529). Las Villas: Combs 220 (E--118796, F--358024); Pringle 9 (W--428424). Matanzas: Eggers 5274 (W--1323162). Oriente: Alain 1992 (Z); Hioram & Btiste 1323 (Um--100); C. F. Millspaugh 1043 (F--61043), 1048 (F--61048); Morton & Alain 9013 (W--2285127); Shafer 1576 (Bi, W--659811). Pinar del Río: Shafer 11144 (W--699300). CAYMAN ISLANDS: Grand Cayman: A. S. Hitchcock s.n. [Jan. 1890] (E--118795); C. F. Millspaugh 1286 (F--61286). JAMAICA: R. C. Alexander s.n. [Rio Cobre] (F--504988), s.n. (W--1048225); S. Brown 306 (D--538924); Crosby, Hespenheide, & Anderson 95 (Mi); Fredholm 3081 (W--315932); W. Harris 11796 (E--792594, W--790858); A. S. Hitchcock s.n. [12-9-'90] (E--118794); H. A. Lang 61 (D--554717), 62 (D--554761); Lloyd 1004 (E--118793, F--228293); Maxon 1657 (W--427952), 2180 (W--520088); Maxon & Killip 313 (W--1046009), 1605 (W--1046615); C. F. Millspaugh 921 (F--60921), 1910 (F--87523); Orcutt 1943 (Ca--430599), 2276 (Ca--430600); F. W. Pennell 11225 (D--645442); Sauer 1865 (Ws); Yuncker 17028 (Mi, S). HISPANIOLA: Dominican Republic: Abbott 498 (W--1078620), 646 (W--1078619), 648 (W--1078621), 1026 (W--1078783), 1200 (W--1078865); B. Augusto 1045 (N); Faris 303 (W--1145872), 324 (W--1145889); Fuertes 886 (W--698029); C. Junge 2992 (W--2253742); Raunkiaer 869 (W--1110063); Valeur 443 (W--1273793); Wright, Parry, & Brummel 354 (W--43512, W--43513). Haiti: Ekman H.7958 (W--1412858); E. C. Leonard 2943 (W--1075189), 3101 (W--1075358), 3302 (W--1075595, W--1075596), 5124 (W--1077716), 5229 (W--1077836), 7506a (W--1149369); Leonard & Leonard 14389 (W--1452822), 15413 (W--1453679). PUERTO RICO: Goll 68 (W--408661), 150 (W--408737), 675 (W--409218); A. A. Heller 6181 (D--500557, E--118286, W--426417); Heller & Heller 149 (W--425694); Johnston & Stevenson 1297 (W--1475943); C. F. Millspaugh 337 (F--60337); Sintenis 157 (W--1323151), 1857 (W--1323158); Underwood & Griggs 201a (W--405934), 529 (W--405472); Velez 2918 (N). VIEQUES: Shafer 2425 (W--759977). VIRGIN ISLANDS: St. Croix: A. E. Ricksecker 167 (Ca--473250, E--118792, W--278058); L. A. Ricksecker 131 (E--118791, W--425294); Thompson 842 (D--619098), 866 (D--619082). St. John: Britton & Shafer 507 (W--756417). St. Thomas: Eggers 26 (W--1110232), 365 (W--1323152), s.n. [Novbr. 1882] (W--1323153), s.n. [Dec. 1886] (F--141757); Ehrenberg 107 (E--114062); Krebs s.n. (F--131515). LEEWARD ISLANDS: Antigua: Box 1021 (N). Guadeloupe: Duchassaing s.n. (E--188790); Questel 4566 (W--2453646). Montserrat: Shafer 138 (W--695158). WINDWARD ISLANDS: Barbados: Bovell & Freeman s.n. [Bot. Stat. Herb. 139] (F--200798, W--845534); G. S. Miller 57

(W--1147613). Grenada: W. E. Broadway s.n. [Oct. 26, 1904] (E--118788, F--175765, W--429675), s.n. [November 1904] (F--175766). Martinique: A. Duss 1961a (W--849739); Hahn 962 (Ca--332486); Kohaut s.n. [Sieber Fl. Mart. 316, in part] (E--118789). St. Vincent: Morton 4826 (W--1883987), 5441 (W--1884351). TOBAGO: W. E. Broadway 4845 (W--759676); Eggers 5832 (W--1323159); Purseglove P.6221 (W--2429305). TRINIDAD: Britton & Hazen 162 (W--1046834); Trin. Bot. Gard. Herb. 2417 (W--1323157). MARGARITA ISLAND: Miller & Johnston 96 (E--118801, W--417828). COLOMBIA: Antioquia: Archer 1447 (W--1542191); Toro 328 (W--1342845). Atlántico: Dugand 5428 (W--2369330); Elias 556 (W--1422489), 871 (W--1543262), 1035 (F--700259); Paul 871 (F--694282), C.42 (W--1281942); F. W. Pennell 12040 (D--612594). Bolívar: Heriberto 16 (W--1041071); Killip & Smith 14043 (F--638258, W--1350042); F. W. Pennell 4198 (W--1043036). Cundinamarca: Mutis 3689 (W--1562717); M. Schneider 1006 (S). Magdalena: C. Allen 241 (E--1014278), 461 (E--1014158); H. H. Smith 545 (D--509368, E--118799, Hi--197314, Mi, W--533047), 1465 (D--509362, E--118798, W--533554). Tolima: Holton 496 (D--510664). Valle del Cauca: Holton 495 (D--610664); Walker 1265 (E--928047). VENEZUELA: Bolívar: J. A. Steyermark 88186 (N). Carabobo: Asplund 15133 (S). Delta Amacuro: Rusby & Squires 306 (Ca--52343, E--118797, W--325638). Lará: Saer 580 (F--689842). Sucre: W. E. Broadway 67 (W--1188701). Trujillo: E. Reed 1077 (W--1693921). Zulia: Lasser 2560 (Ve--28166); Moc-querys 909 (B), s.n. [Zulia] (N). BRITISH GUIANA: A. S. Hitchcock 16593 (W--1055889), 16773 (W--1056033); Irwin R.117 (Au--165429, Au--178036); Persaud 402 (F--532958). SURINAM: Lanjouw & Lindeman 1454 (N); Mayo s.n. [May 5, 1905] (D--599922). FRENCH GUIANA: W. E. Broadway 89 (W--1068463). ECUADOR: Guayas: Asplund 15373 (S); Gilmartin 690 (N, W--2428422). Los Ríos: Asplund 5596 (W--1930558). Manabi: Anthony & Tate 118 (W--1192206). GALAPAGOS ISLANDS: Charles: A. Stewart 3312 (Bi, E--817128, W--921595). Chatham: Schimpff 151 (E--1072193, Gg--212449). Indefatigable: Itow 139 (Du--564525), 139a (Du--564524); I. L. Wiggins 18385 (Ac), 18628 (Rf). PERU: Amazonas: Woytkowski 5617 (W--2396944), 5618 (W--2396945). Huánuco: Asplund 12096 (W--2224504). Junín: Macbride 5296 (F--536321, W--1515777). Loreto: Klug 1238 (F--629918, W--1456249); Ll. Williams 291 (F--603732, W--1471270), 397 (F--603911), 418 (F--603834), 3213 (F--618573), 3331 (F--623688), 4158 (F--622962, W--1498401), 4428 (F--624741). San Martín: Allard 21510 (W--2025166). Tumbes: Weberbauer 7737 (F--571884). Department undetermined: Rufz 4785 (W--249769). BRAZIL: Amazonas: Chagas s.n. [Herb. Inst. Nac. Pesq. Amaz. 2033] (Bs); Herb. Inst. Nac. Pesq. Amaz. 939 [2] (Bs).

NEW SPECIES OF PASPALUM

Jason R. Swallen

Ceresia

1. PASPALUM SPISSUM Swallen, sp. nov.

Culmi erecti, 50-60 cm. alti; laminae erectae, appressae, 6-8 cm. longae, 2-3 mm. latae, prominente papilloso-hispidae; spiculae 4.2 mm. longae; gluma secunda longipilosa; lemma sterile marginibus ciliatum; fructus 3.4 mm. longus, pallidus, summo ciliatus.

Perennial; culms stiffly erect, 50-60 cm. tall; cataphylls conspicuously appressed-villous; sheaths all longer than the internodes, about 15 completely covering the culm, glabrous; blades erect, appressed, 6-8 cm. long, 2-3 mm. wide, acuminate, prominently papillose-hispid; racemes 1 or 2, when 2, one a short distance below the other, 1 mm. wide with narrow margins; spikelets 4.2 mm. long, the second glume pilose with long hairs on the lower part of the back, a few hairs extending on the margins to the summit, the sterile lemma appressed-pilose on the lower part of the back, the margins ciliate on the upper half; fruit 3.4 mm. long, pale, the lemma rounded, ciliate at the summit.

Type in the U. S. National Herbarium, No. 1612651, collected among rocks at top of rocky hill, Carolina to San Antonio de Balsas, Maranhão, Brazil, March 20-25, 1934, by Jason R. Swallen (No. 4050). Also collected approximately in the same locality (Swallen 4077, 4078), and from Grajahú to Porto Franco, Maranhão (Swallen 3796).

Paspalum spissum is related to P. carinatum Humb. & Bonpl., but differs greatly in having flat appressed blades completely covering the culm, conspicuously villous cataphylls, and very narrow margins on the racemes. In P. carinatum the blades are involute, crowded toward the base of the plant, the lowermost sheaths are scarcely pilose, and the margins of the racemes are broad. There is little difference in the spikelets, although those of P. carinatum average slightly larger.

Notata

2. PASPALUM NITIDUM Swallen, sp. nov.

Culmi caespitosi, 8-14 cm. alti; laminae 1.7-4 cm. longae, 2-3 mm. latae, pilosae; racemi 2, subconjugati, rhachi glabri; spiculae 1.5 mm. longae,

glabrae, ellipticae vel obovatae; fructus pallidus, gluma secunda et lemmate sterile brevior.

Perennial; culms densely tufted, erect, 8-14 cm. tall; lower sheaths densely appressed or spreading pilose, the upper sparsely pilose or nearly glabrous; ligule membranaceous about 0.5 mm. long; blades 1.7-4 cm. long, 2-3 mm., or rarely 4 mm. wide, densely pilose on both surfaces; racemes 2, subconjugate, 1-2 cm. long, the rachis glabrous, even on the margins; spikelets 1.5 mm. long, smooth, shining, elliptic, or slightly obovate, the tip rounded or sometimes minutely pointed; fruit pale, somewhat shorter than the second glume and sterile lemma.

Type in the U. S. National Herbarium, No. 2383777, collected on campo at Monte Crista, Garuva, São Francisco do Sul, Santa Catarina, Brazil, March 3, 1961, by R. Reitz & R. Klein (No. 10900). Also collected by Reitz & Klein at Barra do Sul, Araquarí (No. 520).

This species is the small member of the Notata group, perhaps more closely related to P. pumillum Nees than anything else. It differs, however, in having smaller spikelets and densely pilose foliage.

Livida

Plants annual.
  Racemes 4-7, 2-2.5 cm. long, the rachis 0.5 mm. wide, glabrous, the margins scabrous; spikelets 1.6-1.7 mm. long, the tip rounded. 3. P. pisinnum
  Racemes 5-19, usually more than 10, the rachis 0.8 mm. wide, pubescent or scabrous on the surface, with long hairs on the margins; spikelets 1.9-2 mm. long, very scabrous, apiculate. 4. P. trinii

Plants perennial.
  Lowermost sheaths densely pilose toward the base.
    Culms very slender; racemes 3-10, appressed, 1-2 cm. long, on a flexuous axis; axils of the racemes glabrous; spikelets 1.8-2 mm. long, apiculate; blades subfiliform. 5. P. trichophyllum
    Culms stouter; racemes mostly 10-20, ascending to spreading, the lower up to 5 cm. long, long-pilose in the axils; spikelets 2-2.2 mm. long, rounded at the tip..... 6. P. goeldii
  Lowermost sheaths glabrous or nearly so toward the base.
    Spikelets 2.3-2.5 mm. long; culms decumbent-spreading, often rooting at the lower nodes; racemes relatively distant, spreading, the rachis 1.5-2 mm. wide, usually without long hairs. 7. P. denticulatum

Spikelets 1.4 mm. long; culms erect or geniculate at the lower nodes; racemes crowded, appressed, the rachis 0.5 mm. wide, long-ciliate.
8. P. humigenum

3. PASPALUM PISINNUM Swallen, sp. nov.

Culmi erecti, 15-27 cm. alti, glabri; laminae planae, 5-10 cm. longae, 2-3 mm. latae, scabrae; racemi 4-7, anguste adscendentes, 2-2.5 cm. longi; spiculae solitariae, 1.6-1.7 mm. longae, obovatae; fructus pallidus, minute striatus.

Annual; culms erect or ascending, 15-27 cm. tall, more or less geniculate at the nodes, glabrous; sheaths shorter than the internodes, glabrous, the uppermost glabrous; ligule 3 mm. long, whitish, somewhat decurrent; blades flat, lax, 5-10 cm. long, 2-3 mm. wide, acuminate, scabrous-roughened on both surfaces, the midnerves and margins scabrous, with a few long hairs near the base; inflorescence 3-4 cm. long, composed of 4-7 appressed or narrowly ascending racemes 2-2.5 cm. long, the rachis 0.5 mm. wide, glabrous, the margins scabrous; spikelets solitary, pale, 1.6-1.7 mm. long, broad and rounded at the summit, slightly obovate; second glume and sterile lemma thin, 3-nerved, the green nerves contrasting with the pale body, the lateral nerves conspicuously scabrous; fruit pale, minutely striate.

Type in the U. S. National Herbarium, No. 1613175, collected in wet open ground near swamp, Fazenda Nacional to Picos, Piaui, Brazil, April 4-5, 1934, by Jason R. Swallen (No. 4217).

4. PASPALUM TRINII Swallen, sp. nov.

Culmi 90 cm. alti, erecti, ramosi, glabri; vaginae sparse longipilosae; laminae planae, 17-28 cm. longae, 3-4 mm. latae, acuminatae, sparse longipilosae; racemi 10-12, appressi, usque 3.5 cm. longi; spiculae 1.9-2 mm. longae, obovatae, apiculatae, marginibus scabrosae; fructus pallidus late acutus.

Annual; culms about 90 cm. tall, erect, branching at the lower nodes, glabrous, or the nodes sparsely pilose; sheaths elongate, densely scabrous-roughened and sparsely pilose with long hairs; ligule 2.5-3 mm. long, membranaceous, decurrent; blades flat, 17-28 cm. long, 3-4 mm. wide, acuminate, densely scabrous-roughened like the sheaths and sparsely pilose with long hairs; inflorescences about 10 cm. long, composed of 10-12 appressed or narrowly ascending racemes, the lowermost as much as 3.5 cm. long, the rachis 0.8 mm. wide, scaberulous or pubescent on the surface, the margins very scabrous, and with a few long hairs; spikelets 1.9-2 mm. long, oblong or slightly obovate, apiculate, usually tinged with purple; second glume and

sterile lemma scabrous, 3-nerved, the marginal nerves conspicuously scabrous; fruit pale, broadly acute.

Type in the U. S. National Herbarium, No. 1613382, collected in muddy pond, Cratheús, Ceará, Brazil, May 9-10, 1934, by Jason R. Swallen (No. 4507).

British Guiana: Rupununni Savanna, Melville (Herbarium No. 162). Brazil: Ceará: Junco to Quixada, Swallen 4463; Cratheús, Swallen 4510. Piaui: Picos, Swallen 4225; Fazenda Nacional, Swallen 4201. Maranhão: Caxias to Barra do Corda, Swallen 3524. Bahia: Joazeiro, Dorsett & Popenoe 406b.

5. PASPALUM TRICHOPHYLLUM Henr. Blumea 4: 513. 1941.

Brazil: Pará: Ilha Marajó, Kuhlman 2135; Black & Engelhard 50-8984, 50-8985; Soure, Black 50-8844; Black & Lobato 50-9304; Fazenda Tuiuiú, Rio Arari, Black, Ledoux & Stegemann 52-14255; Fazenda Camburupy, Swallen 4940; Fazenda Gavinho, Goeldi 165 (type). Ilha Mexicana: Santa Maria, Huber 2400.

6. PASPALUM GOELDII Swallen, sp. nov.

Culmi erecti vel decumbentes, 65 cm. alti, glabri; laminae ca. 25 cm. longae, 3-4 mm. latae, erectae vel patentes, glabrae; racemi 20, adscendentes, usque 5 cm. longi; spiculae 2-2.2 mm. longae, ellipticae, dense pubescentes; fructus pallidus, striatus.

Perennial; culms erect or decumbent at the base, 65 cm. high, glabrous; sheaths all longer than the internodes, the lowermost densely pilose at the base, otherwise glabrous; ligule 5 mm. long, brown; blades about 25 cm. long, 3-4 mm. wide, erect to spreading, glabrous or nearly so on the surface, the margins scabrous; inflorescence 14 cm. long, the axis densely pubescent with scabrous margins, composed of 20 ascending racemes, the lowermost 5 cm. long; rachis with long hairs in the axils, 0.8-1 mm. wide, pubescent, the margins scabrous and with a few long, scattered hairs; spikelets 2-2.2 mm. long, elliptic, more or less obovate, apiculate; second glume and sterile lemma densely pubescent, 3-nerved, the marginal ones strongly scabrous; fruit pale, striate.

Type in the U. S. National Herbarium, No. 1039605, collected on open savannas, Estate Gavinho, Marajó Island, Pará, Brazil, June 1918, by André Goeldi (No. 197).

Additional specimens examined: Brazil: Pará: Marajó Island: Estate Gavinho, Goeldi 169, 180, 185, 192, 193, 200, 250; Fazenda Menino Deus, Black & Engelhard 50-9028, 50-9038, 50-8982; Soure: Black & Camargo 8873, 8876; Monte Alegre, Swallen 3336; Ceará: Sobral, Avelino & Black 118c.

7. PASPALUM DENTICULATUM Trin. Gram. Pan. 111. 1826.

8. PASPALUM LUNICOMUM Swallen, sp. nov.

Culmi erecti, 20-42 cm. alti, glabri; laminae planae, 12 cm. longae, 2-4 mm. latae, glabrae, margin-ibus scabrae; racemi 4-8, appressi vel adscendentes, usque 2 cm. longi; rhachis prominente ciliata pilis 7 mm. longis; spiculae 1.3-1.4 mm. longae, ellipticae vel obovatae, apiculatae, glabrae.

Perennial; culms erect or geniculate at the lower nodes, 20-42 cm. tall, sometimes branching at the lower nodes, glabrous; sheaths all much shorter than the internodes, compressed, keeled, glabrous, the uppermost glabrous; ligule 3 mm. long; blades flat, as much as 12 cm. long, 2-4 mm. wide, glabrous on both surfaces, the margins scabrous; inflorescence 2.5-5 cm. long, composed of 4-8 appressed or ascending racemes as much as 2 cm. long; rachis 0.5 mm. wide, pilose in the axils, glabrous, the margins scabrous, ciliate with prominent white hairs about 7 mm. long; spikelets 1.3-1.4 mm. long, elliptic-obovate, purple-tinged, sometimes apiculate, glabrous; second glume and sterile lemma 3-nerved, the marginal nerves very scabrous; fruit pale, minutely striate.

Type in the U. S. National Herbarium, No. 1255130, collected near river inside zone of Typha and sedges at Rio Salitre, 45 km. west-southwest of Joazeiro, Bahia, Brazil, December 15, 1924, by Agnes Chase (No. 7931).

Recta

9. PASPALUM PILOSUM Swallen, sp. nov.

Culmi caespitosi, erecti, 70-85 cm. alti, glabri; vaginae basi tomentosae; laminae 35 cm. longae, in-volutae, basi papilloso-hispidae; racemi 5-8, adscen-dentes, inferiores 4-5 cm. longi; spiculae solitariae vel binae, 1.8-1.9 mm. longae, glabrae, pedicellis pubescentibus 0.5 mm. longis.

Perennial; culms tufted, erect, 70-85 cm. tall, glabrous; sheaths tomentose at the base, becoming pilose at the summit, those of the culm glabrous except for long hairs in the mouth, almost bladeless; blades involute, as much as 35 cm. long, curved, papillose-hispid at the base, the hairs long, becoming glabrous in the upper half, the inner surface pubescent; inflor-escence 4-8 cm. long, composed of 5-7 ascending racemes, the lower 4-5 cm. long, the rachis 0.4-0.5 mm. wide, glabrous; spikelet solitary or sometimes paired, 1.8-1.9 mm. long, on usually pubescent pedicels 0.5 mm. long; second glume and sterile lemma elliptic, broadly acute, 5-nerved, the midnerve much stronger than the lateral, glabrous; fruit as long as the spikelet, smooth or minutely striate, shining.

Type in the U. S. National Herbarium, No. 1910825, collected on open ledge of mountainside, Cerro Camejen,

about 1°N, 72°W, Vaupés, Colombia, July 24, 1943, by Carl O. Grassl (No. 10015).

Apparently this species belongs to the Recta group, but the racemes are paniculate rather than solitary or in pairs.

Quadrifaria

10. PASPALUM CHAPADENSE Swallen, sp. nov.

Culmi erecti, 90 cm. alti, nodis pilosis; laminae erectae, 30-32 cm. longae, 12 mm. latae, marginibus papilloso-ciliatis; racemi 28, adscendentes, 5-6 cm. longi; spiculae densae, binae, 1.6-1.8 mm. longae, 0.8 mm. latae, acutae, dense pubescentes; gluma secunda spicula brevior.

Perennial; culms erect, 90 cm. tall, the nodes appressed-silky-pilose; sheaths all longer than the internodes, glabrous, ciliate toward the summit, with some hairs on the collar; blades erect or nearly so, those of the midculm 30-32 cm. long, 12 mm. wide, the lower ones and the uppermost reduced, scabrous and papillose-ciliate on the margins; inflorescence 18 cm. long, composed of 28 slender ascending racemes 5-6 cm. long, the rachis 0.3-0.4 mm. wide, densely hairy in the axils; spikelets dense, paired, 1.6-1.8 mm. long, 0.8 mm. wide, acutish, elliptic-obovate, densely pubescent, the pedicels less than 0.5 mm. long; second glume shorter than the spikelet exposing the light minutely striate fruit.

Type in the U. S. National Herbarium, No. 2238394, collected in chapada between Caxias and Barra do Corda, Maranhão, Brazil, February 18-26, 1934, by Jason R. Swallen (No. 3508). This species has been collected in northeastern Brazil, as follows: Maranhão: Brejo (São Luis to São José), Swallen 3474; Caxias to Barra do Corda, Swallen 3519, 3562, 3563, 3565, 3566, 3601; Barra do Corda to Grajahú, Swallen 3708; Carolina to San Antonio de Balsas, Swallen 4012. Ceará: Swallen 4652. Pernambuco: Tapera, Pickel 1239.

The number of racemes varies in this species, from 4-28, but there are no other differences to note.

11. PASPALUM DASYTRICHIUM Dusen, sp. nov.

Culmi 140 cm. alti, internodiis inferioribus abbreviatis, nodi appresso-villosi; ligula ca. 1 cm. longa; laminae 30 cm. longae, 1½ mm. latae, planae, firmae, appressae, papilloso-ciliatae; racemi 25, adscendentes, usque 9 cm. longi; spiculae 2 mm. longae, 0.8 mm. latae, ellipticae; gluma secunda fructu 1/4-1/2 brevior.

Perennial; culms hard, erect from a decumbent base, 140 cm. tall, the lower internodes much shortened, their accompanying leaves falling early, leaving the base of

the culm densely villous, the upper internodes glabrous, glaucous, the nodes appressed villous; sheaths densely ascending papillose-villous toward the base becoming less so toward the summit, the upper ones papillose only or glabrate; ligule firm, brown, about 1 cm. long; blades of the midculm as much as 30 cm. long, 14 mm. wide, firm, flat, appressed, papillose-ciliate, the hairs about 5 mm. long; inflorescence 25 cm. long, composed of 25 or more ascending racemes, the lower one as much as 9 cm. long, becoming shorter toward the summit, bearing short appressed branchlets, especially toward the base; spikelets 2 mm. long, 0.6 mm. wide, brown, elliptic; second glume thin, nerveless, 1/2-3/4 as long as the fruit, often as long as the fruit, 1-3-nerved, the sterile lemma as long as the fruit, 3-nerved; fruit light-colored, the same shape and size as the spikelet.

Type in the U. S. National Herbarium, No. 2302271, collected among rocks, Villa Velha, Paraná, Brazil, October 21, 1914, by P. Dusen (No. 15700). This species is credited to Dusen because the name is written on the label as a new species, but it was never published. Also collected in São Paulo, at Caietras by Kuhlman (No. 36620), and at Brigadeiro Tobias by Hoehne & Gehrt (No. 36726).

Linearia

12. PASPALUM VESCUM Swallen, sp. nov.

Culmi erecti, gracillimi, 25-35 cm. alti; laminae 5-15 cm. longae, filiformes, glabrae; racemus 1, erectus, 2-3 cm. longus; spiculae solitariae vel binae, 2.3-2.7 mm. longae, pallidae, pedicellis 1 mm. longis scabris; gluma secunda et lemma sterile tenuia, 3-nervia, glabra; gluma secunda fructu 1/5-1/4 brevior.

Perennial; culms erect, very slender, solitary or 2 together in small tough tufts, 25-35 cm. tall, with one culm node, glabrous; sheaths glabrous, or occasionally with a few long hairs, the culm sheath bladeless; ligule 0.5-1 mm. long, decurrent; blades 5-15 cm. long, filiform, usually glabrous, but sometimes with a few long scattered hairs; raceme 1, erect, 2-3 cm. long; spikelets solitary or paired, somewhat inflated, 2.3-2.7 mm. long, pale, on round scabrous pedicels about 1 mm. long; second glume and sterile lemma thin, apparently 3-nerved, glabrous, the glume about 3/4-4/5 as long as the pale, pointed, minutely striate fruit.

Type in the U. S. National Herbarium, No. 1448779, collected in peaty soil on boggy slope, at Uberlandia, Minas Gerais, Brazil, by Agnes Chase (No. 11259).

Also collected in "Terreno brejoso beira corrego de Baú," Campo Alegre, São Paulo, Brazil, by Toledo & Gehrt (Dept. Bot. São Paulo 43200).

13. PASPALUM CRISPULUM Swallen, sp. nov.

Culmi gracillimi, dense caespitosi, 23-33 cm. alti; laminae usque 10 cm. longae, filiformes, sparse papilloso-pilosae; racemi 2, conjugati, adscendentes; spiculae 1.9-2 mm. longae, 0.8 mm. latae, solitariae, elliptico-lanceolatae, glabrae; fructus albus, apiculatus, minute striatus.

Perennial; culms very slender, in dense tufts, 2-noded, 23-33 cm. tall; sheaths shorter than the internodes, glabrous or with a few long hairs in the throat, nearly bladeless, those of the innovations appressed-pilose, the two culm sheaths nearly bladeless; blades mostly basal, less than 10 cm. long, filiform, often curved, sparsely long papillose-pilose to nearly glabrous; racemes 2, conjugate, ascending, the rachis about 0.4 mm. wide, the basal portion and upper part of the culm long-pilose; spikelets 1.9-2 mm. long, 0.8 mm. wide, solitary, elliptic-lanceolate, glabrous, not crowded, the pedicels about 0.4 mm. long; sterile lemma 5-nerved, the lateral nerves approximate, the second glume 5-nerved, the nerves more evenly spaced; fruit white, dull, minutely striate, apiculate.

Type in the U. S. National Herbarium, No. 2208290, collected on campo at Macido, Niquelandia, Goias, Brazil, by A. Macedo (No. 4432).

14. PASPALUM PALLENS Swallen, sp. nov.

Culmi erecti, compressi, 115 cm. alti, glabri; laminae 10-20 cm. longae, adscendentes, involutae, supra dense pubescentes; racemi 2, conjugati, 7-9 cm. longi; spiculae 3.4 mm. longae, 1.2 mm. latae, anguste ellipticae, glabrae; fructus albus, minute punctatus.

Perennial; culms erect, soft, compressed, about 115 cm. tall, glabrous; sheaths overlapping on the lower part of the culm, shorter than the internodes above, compressed, keeled, glabrous; ligule very thin and fragile, 5 mm. long, hidden, not excurrent; blades 10-20 cm. long, ascending, more or less curved, inrolled, densely pubescent on the upper surface, glabrous beneath; racemes 2, conjugate, ascending, 7-9 cm. long, the rachis 0.5-0.6 mm. wide, glabrous even on the margins; spikelets 3.4 mm. long, 1.2 mm. wide, narrowly elliptic, on glabrous pedicels about 1 mm. long; second glume and sterile lemma equal, faintly 5-nerved, glabrous, light green; fruit white, minutely punctate-roughened.

Type in the U. S. National Herbarium, No. 1982916, collected in lake, at Santa Terezinha, Ituiutaba, Minas Gerais, Brazil, February 18, 1950, by A. Macedo (No. 2167). A second collection was made at the same time and place (Macedo 2164).

15. PASPALUM FESSUM Swallen, sp. nov.

Culmi graciles, erecti, 50 cm. alti, glabri; laminae graciles, involutae, 14-19 cm. longae, supra minute pubescentes; racemi 2, conjugati, 3-5 cm. longi, glabri; spiculae 2.4 mm. longae, 0.8 mm. latae, pallidae, pedicellis 0.5 mm. longis, glabris; gluma secunda et lemma sterile pallida, tenuia, 5-nervia, glabra; fructus albus, obtusus, marginibus parallelis.

Perennial; culms slender, erect from an ascending base, 50 cm. tall, glabrous, the lower internodes short; sheaths all shorter than the internodes, glabrous; ligule 5 mm. long, decurrent, very thin and fragile, brown; blades slender, inrolled, 14-19 cm. long, glabrous on the lower surface, densely and minutely pubescent on the upper; racemes 2, conjugate, ascending, 3-5 cm. long, about 0.4 mm. wide, glabrous throughout; spikelets 2.4 mm. long, 0.8 mm. wide, pale, on glabrous pedicels about 0.5 mm. long; second glume and sterile lemma pale, thin, faintly 5-nerved, rounded at the summit, just covering the fruit; fruit white or greenish-white, round at the tip, the sides nearly parallel, minutely striate.

Type in the U. S. National Herbarium, No. 2076285, collected in sandy humid soil on the bank of the Rio Paranaiba, Praião, Ituiutaba, Minas Gerais, Brazil, September 3, 1950, by A. Macedo (No. 2543).

16. PASPALUM AMBUSTUM Swallen, sp. nov.

Culmi dense caespitosi, erecti, 75-100 cm. alti; laminae 30-50 cm. longae ad basim longiattenuatae, supra dense et molliter pilosae, marginibus scabrosis; racemi 8 vel 9, 4-5 cm. longi, appressi; spiculae binae, 3.4-3.6 mm. longae, 1.8 mm. latae, ellipticae, glabrae; fructus pallidus, compressus, papillosus.

Perennial; culms densely tufted, erect, 75-100 cm. tall; sheaths all longer than the internodes, the uppermost partly enclosing the base of the panicle; basal blades 30-50 cm. long, long-attenuate to the base, densely and softly pilose above, glabrous beneath, the margins very scabrous, the upper culm blades much smaller; inflorescence 12-14 cm. long, composed of 8 or 9 appressed racemes, 4-5 cm. long, the rachis 0.8 mm. wide, very scabrous on the margins; spikelets in pairs, 3.4-3.6 mm. long, 1.8 mm. wide, elliptic, bluntly acute, glabrous; fruit pale, flattened, papillose-roughened.

Type in the U. S. National Herbarium, No. 1961593, collected in banhado, Estacão experimental, Ponta Grossa, Paraná, Brazil, February 5, 1946, by Jason R. Swallen (No. 8466).

The following specimens probably can be referred to this species: Swallen 8429, 8791.

Paspalum ambustum appears to be between the

Linearia and Virgata groups. It has the habit of other species of the Linearia group but the blades are very scabrous on the margins and the spikelets are in pairs, characters of the Virgata group.

Eriantha

Blades narrow, involute.
  Spikelets 5 mm. long; racemes erect, appressed. 17. P. album
  Spikelets 3.6-3.8 mm. long; racemes ascending.
    Spikelets long-pilose or papillose-pilose, the hairs not obscuring the spikelet. 18. P. diamantinum
    Spikelets densely covered with long silky hairs, obscuring the spikelet..... 19. P. involutum
Blades flat, broader.
  Blades densely and softly pilose.. 20. P. mollifolium
  Blades glabrous or more or less hispid.
    Spikelets 4-4.2 mm. long.
      Blades glabrous, narrower at the base than the mouth of the sheath..... 21. P. rigens
      Blades conspicuously spreading-pilose or hispid, narrowed but wider than the mouth of the sheath..... 22. P. intonsum
Spikelets not more than 3.6-3.7 mm. long.
  Blades 8-10 mm. wide, evenly distributed. 23. P. haughtii
  Blades not more than 5 mm. long, usually less, mostly crowded to the base of the plant.
    Spikelets 3 mm. long; blades glabrous. 24. P. sericatum
    Spikelets 3.6-3.7 mm. long; blades hirsute.
      Culms loosely tufted, rhizomatous; blades 3-8 cm. long..... 25. P. pauciflorum
      Culms densely tufted, not rhizomatous; blades 8-14 cm. long..... 26. P. formosulum

17. PASPALUM ALBUM Swallen, sp. nov.

Culmi erecti, 90 cm. alti, glabri, nodis barbatis; laminae involutae, illa innovationum 12-17 cm. longae, pilosae, hae culmorum usque 45 cm. longae, glabrae; racemi 3-6, anguste adscendentes, inferiores 7 cm. longi; spiculae binae, 5 mm. longae; gluma secunda et lemma sterile acuminata, dense villosa, 5-nervia; fructus 4 mm. longus, acutus, pallidus, striatus.

Perennial; culms erect, 90 cm. tall, glabrous, the nodes bearded with ascending silky hairs; lower sheaths appressed-pilose, the upper elongate, glabrous, nearly bladeless; ligule brown, membranaceous, 1 mm. long; blades loosely involute, those of the innovations 12-17 cm. long, pilose, those of the culm as much as 45 cm. long, glabrous or nearly so; inflorescence 9-10

cm. long, composed of 3-6 narrowly ascending racemes, the lower 7 cm. long; rachis 1 mm. wide, scabrous on the margins; spikelets in pairs, 5 mm. long; second glume and sterile lemma acuminate, densely villous, 5-nerved, the lateral nerves marginal; fruit 4 mm. long, acute, pale, striate.

Type in the U. S. National Herbarium, No. 1500420, collected in sand and gravel on campo, Diamantina, Serra de San Antonio, Minas Gerais, Brazil, altitude 1200-1300 meters, by Agnes Chase (No. 10397).

18. PASPALUM DIAMANTINUM Swallen, sp. nov.

Culmi erecti, 65-75 cm. alti, compressi, glabri; laminae 17-26 cm. longae, plerumque plicatae, 1 mm. latae, supra pubescentes vel pilosae; racemi 3-5, approximati, adscendentes, 7-9 cm. longi, rhachi 0.6 mm. lata marginibus scabra; spiculae 3.6-3.8 mm. longae; gluma secunda et lemma sterile 5-nervia, villosa pilis 1 mm. longis.

Perennial; culms erect, 65-75 cm. tall, flattened, glabrous, the nodes pubescent or pilose; sheaths compressed, keeled, mostly crowded toward the base, the lowermost densely pubescent or pilose, the upper elongate, glabrous, nearly bladeless; ligule a membranaceous rim 0.5 mm. long; blades 17-26 cm. long, usually folded, 1 mm. wide as folded, ascending, pubescent or pilose on the upper surface, or glabrous toward the tip, glabrous beneath; inflorescence composed of 3-5 approximate, ascending racemes 7-9 cm. long, the rachis 0.6 mm. wide, scabrous on the margins; spikelets 3.6-3.8 mm. long, the second glume and sterile lemma 5-nerved, the nerves almost equidistant, villous or papillose-villous with white, spreading hairs about 1 mm. long; fruit as long as the spikelet, greenish, oblong, broadly acute.

Type in the U. S. National Herbarium, collected on white sand and gravel, Diamantina, Serra de San Antonio, Minas Gerais, Brazil, December 27-30, 1929, by Agnes Chase (No. 10401). Also collected near the type locality by Agnes Chase (No. 10347). The racemes of the latter specimen are 1 or 2, and the blades are shorter and finer.

Paspalum diamantinum is related to P. ammodes Trin. which has been placed by Agnes Chase in the Ceresia group along with species having a winged rachis. However, it belongs in a separate group closely allied to the "Erianthae."

19. PASPALUM INVOLUTUM Swallen, sp. nov.

Culmi caespitosi, erecti, 55-70 cm. alti, glabri; laminae 8-15 cm. longae, involutae, ca. 1 mm. latae, fere glabrae, racemi 3, 3.5-5.5 cm. longi, adscendentes; spiculae 3.6 mm. longae, dense longi-pilosae; fructus spicula brevior, acutus, pallidus.

Perennial; culms tufted, erect, 55-70 cm. tall, glabrous; lowermost sheath densely appressed-pilose, those of the culm elongate, glabrous, the uppermost nearly bladeless; ligule about 1 mm. long, decurrent; blades 8-15 cm. long, inrolled, less than 1 mm. wide, glabrous or with a very few scattered hairs; inflorescence composed of 3 ascending racemes 3.5-5.5 cm. long on an axis about 4 cm. long; rachis 1.2 mm. wide, purple, glabrous, the margins obscurely scabrous; spikelets 3.6 mm. long, densely covered with long white hair obscuring the spikelet; fruit shorter than second glume and sterile lemma, acute, pale.

Type in the U. S. National Herbarium, No. 1500757, collected in white sand and gravel at Diamantina, Serra de San Antonio, Minas Gerais, Brazil, 1200-1300 meters altitude, December 27-30, 1929, by Agnes Chase (No. 10400).

20. PASPALUM MOLLIFOLIUM Swallen, sp. nov.

Culmi dense caespitosi, 55 cm. alti, nodis appresso-barbatis; laminae 10-22 cm. longae, 2-3 mm. latae, acuminatae, dense pilosae; racemi 3 vel 4, inferior 4.5 cm. longus; rhachis costa et marginibus pilosa; spiculae 3 mm. longae, solitariae vel binae, dense villosae.

Perennial; culms in dense tufts, 55 cm. tall, the nodes densely appressed-bearded with yellowish hairs; sheaths mostly basal, densely pilose with ascending or spreading hairs, the lower one densely tomentose at the base; blades 10-22 cm. long, 2-3 mm. wide, densely and softly pilose on both surfaces, acuminate, somewhat narrowed toward the base; inflorescence slender, 4 to 5 cm. long, composed of 3 or 4 racemes, the lower 4.5 cm. long, the rachis 1 mm. wide, pilose on the back and margins; spikelets 3 mm. long, solitary or paired, densely covered with long appressed white hairs extending beyond the spikelet; fruit a little shorter than the second glume and sterile lemma, pale, acute.

Type in the U. S. National Herbarium, No. 1500690, collected on campo near Faria, Serra da Bocaina, Minas Gerais, Brazil, altitude 1000-1200 meters, January 6, 1930, by Agnes Chase (No. 10522). Also collected near the type locality by Agnes Chase (No. 10509).

21. PASPALUM RIGENS Swallen, sp. nov.

Culmi erecti, 85-95 cm. alti, glabri; vagina infirma basi dense tomentosa; laminae 15-18 cm. longae, 3-5 mm. latae, acuminatae, glabrae; racemi 3 vel 4, 6-9 cm. longi, adscendentes vel patentes; spiculae 4 mm. longae, dense villosae.

Perennial; culms erect, 85-95 cm. tall, glabrous, the lower nodes densely appressed-hispid; sheaths glabrous, the lowermost densely tomentose at the base;

blades 15-18 cm. long, 3-5 mm. wide, glabrous, acuminate, narrowed to the base, narrower than the mouth of the sheath; inflorescence composed of 3 or 4 ascending or spreading racemes 6-9 cm. long, on an axis 5-7 cm. long; spikelets 4 mm. long, densely white-silky-villous, completely obscuring the spikelets; fruit a little shorter than the second glume and sterile lemma, acute, pale.

Type in the U. S. National Herbarium, No. 1500399, collected on gravelly slope, 5-10 km. west of Diamantina, Serra de San Antonio, Minas Gerais, Brazil, 1300-1500 meters, December 27-30, 1929, by Agnes Chase (No. 10442). Also collected at Faria, Serra da Bocaina, Minas Gerais, by Agnes Chase (No. 10521); Serra de Cipó, George Black.

22. PASPALUM INFONSUM Swallen, sp. nov.

Culmi erecti, 50-70 cm. alti, glabri; laminae 19-24 cm. longae, 3-6 mm. latae, acuminatae, conspicue pilosae pilis appressis vel patentibus 4 mm. longis; racemi 4, adscendentes vel appressi, inferiores usque 7 mm. longi; spiculae 4.2 mm. longae, dense villosae.

Perennial; culms erect, 50-70 cm. tall, glabrous; sheaths appressed-pilose to glabrous; ligule a membranous rim less than 0.5 mm. long; blades erect or ascending, rather stiff, 19-24 cm. long, 3-6 mm. wide, acuminate, narrowed slightly toward the base to the width of the sheaths, conspicuously covered on both surfaces with appressed or spreading hairs, mostly 4 mm. long, densely pubescent just above the ligule as well; inflorescence composed of 4 ascending or appressed racemes, the lower as much as 7 cm. long; rachis 1 mm. wide, hispid on the margins; spikelets 4.2 mm. long, covered with white silky appressed hairs obscuring the spikelet; fruit a little shorter than the second glume and sterile lemma, pale, acute.

Type in the U. S. National Herbarium, No. 1501433, collected on hillside campo, Margreaves, Minas Gerais, Brazil, December 21-22, 1929, by Agnes Chase (No. 10268½).

23. PASPALUM LAUGHLINII Swallen, sp. nov.

Culmi erecti, 130 cm. alti, basi dense villosi, nodis dense appresse-villosis; vaginae marginibus papilloso-ciliatae; laminae 15-26 cm. longae, 0.8-1 cm. latae, marginibus base papilloso-ciliatis ceterum glabrae; racemi 6, adscendentes, inferiores usque 8 cm. longi; spiculae 3.5 mm. longae, binae brevipedicellatae; gluma secunda et lemma sterile acuta, 5-nervia, dense villosa; fructus ellipticus, acutus, pallidus, striatus, spiculam aequans.

Perennial; culms erect, 130 cm. tall, from a rhizome-like base, densely villous with white or reddish

hairs, the nodes densely appressed-villous; lowermost sheaths densely villous toward the base, the upper ones glabrous on the back, papillose-ciliate on the margins; blades 15-26 cm. long, 0.8-1 cm. wide, ascending, gradually narrowed toward the base or subcordate, the margins papillose-hispid toward the base, otherwise glabrous; inflorescence 8-11 cm. long, with 6 ascending racemes, the lower as much as 8 cm. long, 0.9 mm. wide; spikelets 3.5 mm. long, paired, short-pedicellate; second glume and sterile lemma equal, acute, 5-nerved, densely villous with white hairs, the hairs longer on the margins; fruit elliptic, acute, pale, striate, as long as the spikelet.

Type in the U. S. National Herbarium, No. 1706822, collected in open bunches on llanos, about 60 km. S 60° E of Orocue, Comisaría El Vichada, Los Llanos, Colombia, by Oscar Haught (No. 2771).

Paspalum haughtii is closely related to P. erianthus Nees, but differs in being a much taller plant with glabrous foliage evenly distributed on the culm and longer and laxer racemes. Another specimen which matches P. haughtii very closely was collected at Braco, Rio Arinos, Mato Grosso, Brazil, by J. T. Baldwin (No. 3077).

24. PASPALUM SERICATUM Swallen, sp. nov.

Culmi caespitosi, erecti, 40-60 cm. alti; vaginae inferiores appresso-villosae, superiores glabrae; laminae basi aggregatae, 5-10 cm. longae, 2-2.5 mm. latae, acuminatae, glabrae; racemi 2 vel 3, anguste adscendentes; spiculae solitariae, 3 mm. longae, dense villosae, pili spiculam obscurans.

Perennial; culms caespitose, erect, 40-60 cm. tall, the leaves clustered at the base, the culm sheaths bladeless or nearly so, the base slightly enlarged, tomentose; lower sheaths densely appressed-pilose, the upper glabrous or nearly so; ligule a short membraneous rim about 0.5 mm. long; blades mostly basal, 5-10 cm. long, 2-2.5 mm. wide, acuminate, glabrous on both surfaces with a few long hairs on the margins toward the base; racemes 2 or 3, narrowly ascending, the rachis 4.5-7 cm. long, glabrous, with a tuft of long hairs in the axils; spikelets solitary, 3 mm. long, densely villous with white or tawny appressed hairs, completely obscuring the spikelet.

Type in the U. S. National Herbarium, No. 1255284, collected on rocky open slope, Chapeo de Sol, Serra do Cipó, Minas Gerais, Brazil, altitude 1000-1100 meters, March 28-April 1, 1925, by Agnes Chase (No. 9213).

The following specimens may be referred to this species, all from the State of Minas Gerais: Belo Horizonte, Chase 10315; Faria, Serra da Bocaina, Chase 10512; Barbacena, Glazion 16553.

25. PASPALUM PAUCIFOLIUM Swallen, sp. nov.

Culmi erecti, 35 cm. alti, glabri, rhizomatibus curtis tomentosis; laminae 3-8 cm. longae, 3-5 mm. latae, sparse vel dense papilloso-hispidae; racemi 3, appressi, 2-2.5 cm. longi; spiculae 3.6-3.7 mm. longae, solitariae; gluma secunda et lemma sterile acuminata, fructu longiora; gluma secunda hirsuta pilis longis spiculam obscurans; lemma sterile pilosum; fructus pallidus, acutus.

Perennial; culms erect in loose groups from short tomentose rhizomes, 35 cm. tall, glabrous; sheaths rather densely hispid or papillose-hispid, those of the culm nearly bladeless, almost glabrous; blades 3-8 cm. long, 3-5 mm. wide, sparsely to rather densely papillose-hispid; racemes 3, closely appressed, 2-2.5 cm. long, the rachis 0.8 mm. wide, pilose in the axils; spikelets 3.6-3.7 mm. long, solitary; second glume and sterile lemma acuminate, extending a little beyond the fruit, the glume densely hirsute, the hairs long, obscuring the glume, the sterile lemma pilose, the lemma plainly evident; fruit shorter than the spikelet, pale, acute.

Type in the U. S. National Herbarium, No. 1258166, collected by Sellow (number and date not given). Other specimens which may be referred to this species are: Brazil: Rio Grande do Sul: S. Jeronymo, J. Dutra 546; Pedro Orth 1943. Argentina: Provincia de Corrientes: Mercedes, L. R. Parodi 6295.

26. PASPALUM FORMOSULUM Swallen, sp. nov.

Culmi erecti, ca. 60 cm. alti, glabri; vaginae inferiores dense pilosae, basi tomentosae; laminae 8-14 cm. longae, 3-5 mm. latae, acuminatae, hirsutae; racemi 3 vel 4, adscendentes, inferior ca. 6 cm. longus; spiculae 3.6 mm. longae, dense villosae; fructus spicula brevior, pallidus, acutus.

Perennial; culms erect, about 60 cm. tall, glabrous; lower sheaths densely spreading pilose, tomentose at the base, those of the culm glabrous or with a few long hairs near the summit, elongate, nearly bladeless; ligule a membranaceous rim, 0.2 mm. long; blades crowded toward the base, 8-14 cm. long, 3-5 mm. wide, flat, acuminate, hirsute on both surfaces; inflorescence 6-7 cm. long, composed of 3 or 4 ascending racemes, the lower one about 6 cm. long, the rachis 0.9 mm. wide, purple, contrasting sharply with white-haired spikelets; spikelets 3.6 mm. long, completely hidden by the long hairs; fruit shorter than the spikelet, pale, acute.

Type in the U. S. National Herbarium, No. 1501432, collected in small tufts on hillside campo, Hargreaves, Minas Gerais, Brazil, 1350-1400 meters, December 21-22, 1929, by Agnes Chase (No. 10208). Also collected by Agnes Chase near the type locality (No. 10226).

Plicatula

27. PASPALUM INDUTUM Swallen, sp. nov.

Culmi erecti, ca. 1 m. alti, infra paniculas pilosi; laminae erectae vel patentes, 24-40 cm. longae, 7-10 mm. latae, dense pilosae; racemi 2-6, appressi vel adscendentes, 8-18 cm. longi; spiculae 3 mm. longae, 2.0-2.3 mm. latae, obovatae, dense pilosae; fructus obscure rubiginosus.

Perennial; culms erect, over 1 m. tall, rather stout, pilose below the panicle; sheaths all longer than the internodes, densely appressed-pilose; blades firm, erect or somewhat spreading, acuminate, 24-40 cm. long, 7-10 mm. wide, densely pilose like the sheaths, the upper 1-3 greatly reduced; racemes 2-6, ascending or appressed, 8-18 cm. long, the rachis long-pilose like the culm; spikelets 3 mm. long, 2.0-2.3 mm. wide, on short thickened pedicels 0.5-1 mm. long, slightly obovate, the second glume and sterile lemma rather densely appressed-pilose; fruit dark reddish-brown.

Type in the U. S. National Herbarium, No. 601133, collected at "Rio do Terra Vermehha," Paraná, Brazil, March 1, 1909, by P. Dusen (No. 7883).

Additional material examined: Brazil: Paraná: Jaguariahyoa, Dusen 16411; Vilha Velha, Ponta Grossa, Pereira 5202, 5285. Mato Grosso: Campanario, Otero 299. Minas Gerais: Serra do Curral, Chase 8923.

28. PASPALUM LUTICOLUM Swallen, sp. nov.

Culmi 1.5 m. longi, basi 7 mm. crassi, glabri; laminae 20-30 cm. longae, 5-8 mm. latae, attenuatae, marginibus scabris; racemi 10, inferior 12 cm. longus; spiculae 2.1 mm. longae, 1.1-1.3 mm. latae, acutae, glabrae; fructus 2.1 mm. longus, ferruginosus, acutus, striatus.

Aquatic perennial; culms about 1.5 m. long, 7 mm. thick at the base, rather soft and succulent, glabrous; sheaths all longer than the internodes, the upper elongate, nearly reaching the base of the panicle, sparsely hispid toward the summit, somewhat inflated; blades 20-30 cm. long, 5-8 mm. wide, attenuate, with a few long hairs at the base, very scabrous on the margins; inflorescence pyramidal, about 12 cm. long, composed of 10 racemes, the lower 12 cm. long, the uppermost 4 cm., the rachis 2 mm. wide, glabrous, the margins scabrous; spikelets 2.1 mm. long, 1.1-1.3 mm. wide, acute, glabrous, the pedicels slender, about 1 mm. long, almost glabrous; second glume and sterile lemma loose, rumpled, thin, glabrous; fruit 2.1 mm. long, light brown, acute, striate-roughened.

Type in the U. S. National Herbarium, No. 2205852, collected in Lago Uruxiacá, Maicurú, Pará, Brazil, June 16, 1952, by J. M. Pires & Nilo T. Silva (No. 4298).

29. PASPALUM LACUSTRE Chase, sp. nov.

Culmi compressi, graciles, 1 m. longi; laminae planae, 3.5-14 cm. longae, 2-4 mm. latae, glabrae; racemi 4 vel 5, graciles, adscendentes, 3.5-6 cm. longi; spiculae solitariae, 2.5 mm. longae, glabrae; gluma secunda et lemma sterile aequalia, 3-nervia, glabra, fructu longiora; fructus 2 mm. longus, 0.9 mm. latus, pallidus.

Aquatic perennial; culms submerged or floating, slender, compressed, glabrous, 1 m. or more long, the internodes 4-15 cm. long, shorter toward the summit; sheaths rather loose, stiffly ciliate toward the summit, otherwise glabrous, the upper longer than the internodes; ligule membranaceous, 1.5 mm. long, erose; blades flat, lax, 3.5-14 cm. long, 2-4 mm. wide, glabrous; panicle included at base, composed of 4 or 5 slender ascending to somewhat loosely spreading racemes, 3.5-6 cm. long; rachis thin, flat, 1-1.5 mm. wide, glabrous, the margins scabrous; spikelets solitary, 2.5 mm. long, on slender pedicels about 1 mm. long, in 2 rows, contiguous but not crowded; second glume and sterile lemma equal, thin, 3-nerved, pale, glabrous, pointed beyond the fruit; fruit 2 mm. long, 0.9 mm. wide, pale.

Type in the herbarium of the Instituto Agronomico do Norte, Belém, Pará, Brazil, No. 64326, collected in water of a deep lake at Ambé, Amapá, Brazil, July 8, 1951, by Richard L. Fróes & George A. Black (No. 27312). Photograph and fragment in the U. S. National Herbarium.

30. PASPALUM CORDAENSE Swallen, sp. nov.

Culmi 25-50 cm. alti, nodis inferioribus ramosi; laminae 8-25 cm. longae, 4-6 mm. latae, papilloso-pilosae, marginibus scabris; racemi 2, 3.5-8 cm. longi; spiculae binae, 3-3.1 mm. longae, 2.3 mm. latae, obovatae, dense pilosae; fructus badius, nitidus.

Annual; culms erect or spreading, 25-50 cm. tall, branching at the lower nodes, glabrous; sheaths longer than the internodes, papillose-hispid with long spreading hairs, becoming glabrous toward the summit; ligule decurrent, 3 mm. long; blades 8-25 cm. long, 4-6 mm. wide, sparsely to densely covered with long papillose-based hairs, the margins scabrous; inflorescence composed of 2 racemes, 3.5-8 cm. long; spikelets in pairs, 3-3.1 mm. long, 2.3 mm. wide, obovate, rather densely pilose with spreading hairs, the first on short thick pedicels 0.5 mm. long, the second on more slender pedicels 1-1.3 mm. long; second glume 5-nerved, the nerves evenly spaced, the sterile lemma variously spotted with brown; fruit chestnut brown, striate, shining, with a rather conspicuous hump in the center.

Type in the U. S. National Herbarium, No. 2238395, collected on roadside through chapada, Barra do Corda

to Grajahú, Maranhão, Brazil, March 1-5, 1934, by Jason R. Swallen (No. 3618).

Another specimen of the type collection has 4 racemes, and blades as much as 10 mm. wide.

31. PASPALUM CAPERATUM Swallen, sp. nov.

Culmi erecti, 40-50 cm. alti, glabri; laminae 11-15 cm. longae, 2-4 mm. latae, acuminatae, dense pubescentes vel pilosae; racemi 2 vel 3, appressi; rhachis 6-8 mm. lata, marginibus scabra; spiculae 2.7-2.8 mm. longae, 1.5 mm. latae, ellipticae, glabrae; gluma secunda et lemma sterile grosse rugosa.

Perennial; culms in small tufts, erect, 40-50 cm. tall, glabrous; sheaths overlapping, completely covering the culm, the lower ones densely pilose, the upper two on the culm glabrous below, becoming pilose toward the summit, with reduced blades; ligule 0.5 mm. long, brown; blades 11-15 cm. long, 2-4 mm. wide, acuminate, densely pubescent or pilose; inflorescence composed of 2 or 3 appressed racemes, the rachis 6-8 mm. wide, scabrous on the margins; spikelets 2.7-2.8 mm. long, 1.5 mm. wide, elliptic, glabrous, on short, angular, scabrous pedicels about 0.5 mm. long; second glume and sterile lemma very coarsely cross-wrinkled, the glume 5-nerved, the nerves evenly spaced.

Type in the U. S. National Herbarium, No. 1961377, collected on hill above swamp, Horta Florestal, Pelotas, Rio Grande do Sul, Brazil, April 23, 1946, by Jason R. Swallen (No. 9200).

This species is characterized by the erect racemes and the strongly wrinkled second glume and sterile lemma. It belongs to the group of species with evenly spaced lateral nerves of the second glume.

Although the spikelets are immature, a specimen collected on the Fazenda de Criacão, Lages, Santa Catarina (Swallen 6138), is referred to this species.

32. PASPALUM PARANAENSE Swallen, sp. nov.

Culmi dense caespitosi, erecti, ca. 50 cm. alti, glabri, infra nodis glandulosi; laminae erectae, 6-12 cm. longae, 2-4 mm. latae, acuminatae, dense pilosae; racemi 3, erecti, 4-5 cm. longi; spiculae 2.3-2.5 mm. longae, 1.5 mm. latae, binae, ellipticae vel obovatae, subglabrae; gluma secunda et lemma sterile glabra, nitida; fructus 2.2 mm. longus, brunneus, lucidus.

Perennial; culms in small dense tufts, erect, about 50 cm. tall, 3-noded, glabrous, with pale glandular depressions below the nodes; sheaths densely retrorsely pilose, with a very dense line on the collar, the upper two glabrous or pilose toward the summit; ligule 0.6 mm. long; blades erect, 6-12 cm. long, 2-4 mm. wide, acuminate, narrowed to the base, densely pilose, long-hairy above the ligule; inflorescence 4 cm.

long, composed of 3 erect racemes 4-6 cm. long, the rachis 0.6-0.8 mm. wide; spikelets 2.3-2.5 mm. long, 1.5 mm. wide, elliptic or somewhat obovate, in pairs, the pedicels 0.5-1 mm. long, nearly glabrous; second glume and sterile lemma shining, glabrous, the glume 5-nerved, the nerves nearly evenly spaced, very slightly shorter than the fruit at maturity; fruit dark brown, shining, 2.2 mm. long.

Type in the U. S. National Herbarium, No. 1961379, collected on campo, Fazenda Capão Redondo, Guarapuava, Paraná, Brazil, March 20-23, 1946, by Jason R. Swallen (No. 8889).

33. PASPALUM GOYANUM Swallen, sp. nov.

Culmi gracillimi, erecti, 110 cm. alti; laminae elongatae, attenuatae, 15-30 cm. longae, 0.5-1.5 mm. latae, glabrae; racemi 2 vel 3, adscendentes, usque 11 cm. longi; spiculae binae, 2.3-2.5 mm. longae, 1.3-1.4 mm. latae, glabrae; fructus brunneus, lucidus.

Perennial; culms very slender, erect or leaning, 110 cm. tall; sheaths mostly longer than the internodes, or the upper ones shorter, glabrous; ligule firm, 2.5-3 mm. long, protruding from the sheath, brown; blades elongate, attenuate to a fine point, 15-30 cm. long, p.5-1.5 mm. wide, somewhat curled or flexuous, glabrous; inflorescence 10 cm. long, composed of 2 or 3 ascending racemes as much as 11 cm. long, glabrous in the axils, the rachis 0.6 mm. wide, glabrous, even on the margins; spikelets in pairs, elliptic or slightly obovate, 2.3-2.5 mm. long, 1.3-1.4 mm. wide, on nearly glabrous pedicels 0.5-1 mm. long; second glume 5-nerved, the lateral nerves not crowded, glabrous, at maturity a little shorter than the fruit; sterile lemma with a prominent midnerve, the margins broad, reaching almost to the midnerve, glabrous; fruit dark brown, shining.

Type in the U. S. National Herbarium, No. 1501446, collected on campo between Jataby and Rio Araguaya, Goyaz, Brazil, April 3, 1930, by Agnes Chase (No. 11733).

34. PASPALUM PONTANALIS Swallen, sp. nov.

Culmi basi decumbentes-patentes, ramosi, ca. 1 m. longi; laminae 15-26 cm. longae, 2.5-3 mm. latae, attenuatae, glabrae, marginibus scabrae; racemi 5, adscendentes, 6-8 cm. longi; spiculae binae, 2.3 mm. longae, 1.5 mm. latae, glabrae; fructus 2.2 mm. longus, brunneus, lucidus.

Perennial; culms decumbent-spreading at the base, sometimes stolon-like with almost equal internodes, freely branching, about 1 m. long; sheaths longer than the internodes, compressed, keeled, glabrous, as wide at the mouth as the base of the blade; ligule 1 mm. long, not noticeable from the side of the sheath;

blades 15-26 cm. long, 2.5-3 mm. wide, attenuate, usually very scabrous on the margins, otherwise glabrous; inflorescence 10 cm. long composed of 5 ascending racemes 6-8 cm. long; spikelets in pairs, 2.3 mm. long, 1.5 mm. wide, elliptic, on rather slender pedicels 1-1.5 mm. long, glabrous or the second glume sparsely pubescent; sterile lemma reddish brown with a broad light margin, the cross-wrinkles inconspicuous; fruit 2.2 mm. long, dark brown, shining.

Type in the U. S. National Herbarium, No. 1448664, collected in sand and muck on railroad embankment across pontanal, Porto Esparanço, Mato Grosso, Brazil, February 28, 1930, by Agnes Chase (No. 11080).

35. PASPALUM MACEDOII Swallen, sp. nov.

Culmi erecti, 110-120 cm. alti, glabri; laminae planae, 20-55 cm. longae, 5-10 mm. latae, attenuatae, supra basi pilosae; racemi 3 vel 4, 12-16 cm. longi, suberecti; spiculae binae, ovales 3.3-3.5 mm. longae, 2.3 mm. latae; gluma secunda pilosa; lemma sterile glabrum vel sparse pilosum; fructus brunneus, lucidus.

Perennial; culms 110-120 cm. tall, erect, simple, glabrous; sheaths longer than the internodes, glabrous, the lowest ones densely appressed-bearded at the base; blades flat, 20-55 cm. long, 5-10 mm. wide, attenuate, pilose on the upper surface toward the base; racemes 3 or 4, suberect, 12-16 cm. long, the rachis slender, 0.8 mm. wide, glabrous even on the margins; spikelets in pairs, 3.3-3.5 mm. long, 2.3 mm. wide, oval, on round scabrous pedicels about 1 mm. long; second glume and sterile lemma fragile, dark brown, the glume sparsely to densely pilose, the sterile lemma glabrous or sparsely pilose; fruit very dark brown, smooth, shining, with a definite hump in the middle of the lemma.

Type in the U. S. National Herbarium, No. 2208261, collected on campo, Monte Alegre de Minas, Minas Gerais, Brazil, February 10, 1956, by A. Macedo (No. 4299). Also collected at Pirineus, Goias, by A. Macedo (No. 4359, 4366).

36. PASPALUM LATIPES Swallen, sp. nov.

Culmi erecti, 75 cm. alti, glabri vel nodis appresso-pilosis; laminae 15-30 cm. longae, 4-8 mm. latae, attenuatae, papilloso-hispidae; racemi 3 vel 4, adscendentes, 9-10 cm. longi; spiculae 3.5-3.7 mm. longae, 2 mm. latae, glabrae; lemma sterile marginibus elevatis.

Perennial; culms erect, 75 cm. tall, glabrour or the nodes appressed-pilose; sheaths longer than the internodes, keeled, glabrous to sparsely pilose on the back, the margins rather densely papillose-pilose; ligule about 2 mm. long; blades folded, 15-30 cm. long, 4-8 mm. wide, attenuate-pointed, papillose-hispid, the

hairs spreading; inflorescence 10-13 cm. long, composed of 3 or 4 narrowly ascending racemes, the lower 9-10 cm. long, the rachis 1-1.2 mm. wide, scabrous on the margins; spikelets 3.5-3.7 mm. long, 2 mm. wide, glabrous, the pedicels scabrous, about 1 mm. long; second glume 5-nerved, the lateral nerves marginal, the sterile lemma with a broad raised slightly wrinkled margin; fruit dark brown, striate, shining.

Type in the U. S. National Herbarium, No. 2010216, collected on campo, Ituiutaba, Minas Gerais, Brazil, March 8, 1950, by A. Macedo (No. 2188).

The species is closely related to P. macedoii, but the spikelets are differently shaped and glabrous. The specific name refers to the broad base of the spikelets.

37. PASPALUM GUARICENSE Swallen, sp. nov.

Culmi graciles, erecti, ramosi, 55-75 cm. alti; laminae 15-20 cm. longae, 4-7 mm. latae, basi conduplicatae, hirsutae; racemi 4-7, adscendentes, 3-6 cm. longi; spiculae binae, 1.8-1.9 mm. longae, 1.3-1.4 mm. latae, oboovatae; gluma secunda et lemma sterile tenuia, 3-nervia.

Annual; culms slender, erect, branching at the lower nodes, 55-75 cm. tall; sheaths loose, compressed, keeled, hirsute, longer than the internodes, the upper one elongate with a very much reduced blade; ligule about 3 mm. long; blades about 15-20 cm. long, 4-7 mm. wide, conduplicate at the base, hirsute like the sheaths; inflorescence 9-12 cm. long, composed of 4-7 ascending racemes 3-6 cm. long, the rachis 1 mm. wide, rather sparsely papillose-ciliate, the hairs 3-4 mm. long; spikelet in pairs, 1.8-1.9 mm. long, 1.3-1.4 mm. wide, slightly obovate, the second glume and sterile lemma thin, 3-nerved, covering the brown striate fruit.

Type in the U. S. National Herbarium, No. 1343986, collected in humid places, El Dividive, Guarico, Venezuela, September 11, 1927, by H. Pittier (No. 12520).

38. PASPALUM ATRATUM Swallen, sp. nov.

Culmi erecti, valadi, 130 cm. alti; laminae elongatae, 1.5-2 cm. latae, marginibus scabrosae; racemi ca. 20, anguste adscendentes, inferiores usque 14 cm. longi, marginibus scabris; spiculae 3.1 cm. longae, 2 mm. latae, obovatae, glabrae; fructus ferrugineus, lucidus, minute striatus.

Perennial; culms erect, stout, 130 cm. tall; sheaths broad, loose, keeled, the lower ones crowded toward the base, the upper ones elongate, nearly reaching the base of the panicle, glabrous or a few long hairs on the margins toward the summit; ligule 1-2 mm. long, hidden in the sheath; blades elongate, 1.5-2 cm. wide, very scabrous on the margins; inflorescence 25 cm. long, composed of about 20 rather narrowly ascending

racemes, the lower ones as much as 14 cm. long, 1 mm. wide, rather thickish, scabrous on the margins; spikelets 3.1 cm. long, 2 mm. wide, elliptic, slightly obovate, glabrous; second glume and sterile lemma covering the fruit, reddish brown, the lateral nerves of the glume crowded at the margins; fruit reddish brown, shining, minutely striate, the lemma raised in a definite hump.

Type in the U. S. National Herbarium, No. 1501223, collected in moist spot in brushy campo, Campo Grande, Mato Grosso, Brazil, by Agnes Chase (No. 10842).

Additional material examined: Brazil: Mato Grosso: Between Bonito and Rodonopolis, Chase 11899. Goias: Goias, Chase 11846. Minas Gerais: São Miguel, Chase 10551.

39. PASPALUM FORMOSUM Swallen, sp. nov.

Culmi erecti, glabri, 155 cm. alti; laminae 10-25 cm. longae, 2-3 mm. latae, firmae, attenuatae, supra pubescentes, marginibus scabrae; racemi 6, adscendentes, ca. 8 cm. longi; spiculae binae, 2.6-2.7 mm. longae, 1.5-1.6 mm. latae, ellipticae, glabrae.

Perennial; culms erect, 155 cm. tall, glabrous; sheaths 10-12, completely covering the culm, slightly inflated, much broader than the blade, the uppermost to 32 cm. long with a much reduced blade; ligule 2 mm. long, decurrent; blades 10-25 cm. long, 2-3 mm. wide, firm, attenuate, pubescent on the upper surface, the margins scabrous; inflorescence 12 cm. long, composed of 6 ascending racemes about 8 cm. long; spikelets in pairs, 2.6-2.7 mm. long, 1.5-1.6 mm. wide, elliptic, the pedicels slender, scabrous, 1 mm. long; second glume and sterile lemma rather thin, glabrous, the margins of the sterile lemma raised, sometimes with a few obscure cross-wrinkles.

Type in the U. S. National Herbarium, No. 2014969, collected at Santa Terezinho, Ituiutaba, Minas Gerais, Brazil, February 18, 1951, by A. Macedo (No. 3171).

This species is unlike anything else that I have seen. The many broad sheaths, evenly spaced on the culm and completely covering it, and the relatively small blades, are characteristic.

40. PASPALUM PALUDOSUM Swallen, sp. nov.

Culmi erecti, graciles, 95 cm. alti; laminae usque 22 cm. longae, 6-9 mm. latae, erectae, supra marginibus papilloso-hispidae; racemi 4, graciles, patentes, 4.5 cm. longi; spiculae binae, 2.4-2.6 mm. longae, 1.6-1.8 mm. latae, ellipticae, glabrae; fructus atrobrunneus, lucidus.

Perennial; culms erect from a knotty base, simple, slender, 95 cm. tall; sheaths crowded, much longer than the internodes, the line of demarcation between sheath

and blade not evident, the upper two shorter than the internodes, bladeless or nearly so; ligule 0.5 mm. long; blades as much as 22 cm. long, 6-9 mm. wide, erect, papillose-hispid on the upper surface on and near the margins, the margins scabrous as well; inflorescence 6 cm. long, composed of 4 slender spreading racemes about 4.5 cm. long; spikelets in pairs, 2.4-2.6 mm. long, 1.6-1.8 mm. wide, elliptic, glabrous, or the second glume pubescent, on pedicels 0.5 mm. long; sterile lemma reddish with pale raised margins, with few cross-wrinkles; fruit very dark brown, smooth and shining.

Type in the U. S. National Herbarium, No. 1613888, collected in open wet places or in woods, Carolina to San Antonio de Balsas, Maranhão, Brazil, March 20-25, 1934, by Jason R. Swallen (No. 3959).

41. PASPALUM RAMOSUM Swallen, sp. nov.

Culmi erecti, nodis inferioribus ramosi; laminae 8-28 cm. longae, 2-4 mm. latae, glabrae; racemi 5, erecti vel adscendentes, 4-7 cm. longi; spiculae binae, 3.2 mm. longae, 2.1 mm. latae, leviter obovatae, glabrae.

Perennial; culms erect, branching at the lower nodes, glabrous, shining; sheaths loose, all longer than the internodes, glabrous; ligule 1 mm. long, not decurrent; blades 8-28 cm. long, 2-4 mm. wide at the base, erect, entirely glabrous; inflorescence 9-11 cm. long, composed of 5 erect or ascending racemes 4-7 cm. long, with a tuft of long hairs in the axils; rachis 1 mm. wide, the margins scabrous, occasionally with a few long hairs; spikelets in pairs, 3.2 mm. long, 2.1 mm. wide, slightly obovate, on rather thick scabrous pedicels, 1 and 2 mm. long; second glume and sterile lemma glabrous or the glume sometimes very sparsely pubescent.

Type in the U. S. National Herbarium, No. 2205268, collected in sandy moist ground at the Instituto Agronomico do Sul, Pelotas, Rio Grande do Sul, Brazil, November 10, 1954, by José de Costa Sacco (No. 221).

This is one of the very few of the perennial species of the Plicatula group of Paspalum which has branching culms. It is also unique in being almost entirely glabrous. Aside from the type, it was also collected at Pelotas by Costa Sacco (No. 208).

42. PASPALUM CRUSTARIUM Swallen, sp. nov.

Culmi erecti, 25-35 cm. alti, glabri; laminae 6-12 cm. longae, 2.5-4 mm. latae, attenuatae, glabrae, marginibus scabrae; racemi 2 vel 3, patentes, 2-4 cm. longi; spiculae binae, 2.4-2.5 mm. longae, obovatae, glabrae; fructus atrobrunneus, lucidus, striatus, lemma valde convexum.

Annual; culms erect, 25-35 cm. tall, glabrous; sheaths all longer than the internodes, glabrous, or ciliate on the margins; blades 6-12 cm. long, 2.5-4 mm. wide, attenuate, glabrous or the lower ones pubescent, the margins scabrous; inflorescence composed of 2 or 3 spreading racemes 2-4 cm. long, the rachis 0.7 mm. wide, glabrous; spikelets in pairs, 2.4-2.5 mm. long, obovate, glabrous, the sterile lemma flat, embossed, especially around the margins, the second glume variously embossed transversely across the back; fruit dark brown, shining, striate, the lemma strongly convex.

Type in the U. S. National Herbarium, No. 1613877, collected in open woods between Carolina and San Antonio de Balsas, Maranhão, Brazil, March 20-25, 1934, by Jason R. Swallen (No. 3985).

Additional material examined: Brazil: Maranhão: Grajahú to Porto Franco, Swallen 3826; Carolina to San Antonio de Balsas, Swallen 3947, 3968, 3995, 4092, 4101. These specimens vary in size from the type, being as much as 60 cm. tall with blades to 5 mm. wide, and 5 racemes. The spikelets, however, are identical.

43. PASPALUM PANNUCEUM Swallen, sp. nov.

Culmi erecti, 2.3 m. alti, glabri; laminae 20-35 cm. longae, 5-7 mm. latae, ad basim attenuatae, pubescentes; racemi 4, erecti vel adscendentes, 13-16 cm. longi; spiculae atrobrunneae, 3.5 mm. longae; pedicelli breves, summo crateriformes; gluma secunda et lemma sterile grosse rugosa.

Perennial; culms erect, 2.3 m. tall, glabrous; sheaths elongate, all longer than the internodes, narrowed at the summit, the lower ones pubescent or pilose; ligule 3 mm. long, brown, protruding from the lower sheaths; blades 20-35 cm. long, 5-7 mm. wide, attenuate toward the base to the width of the sheath, pubescent on both surfaces, the upper two greatly reduced; racemes 4, erect or ascending, 13-16 cm. long, the rachis 1.5 mm. wide; spikelets dark brown, 3.5 mm. long, paired, or sometimes solitary, on short thick pedicels, the summit crateriform, 0.7-0.8 mm. wide; second glume and sterile lemma very coarsely transversely wrinkled and mottled; fruit reddish brown, striate, covered by the glume and sterile lemma.

Type in the U. S. National Herbarium, No. 1961391, collected in small banhado, Fazenda da Palma, Pelotas, Rio Grande do Sul, Brazil, April 23, 1945, by Jason R. Swallen (No. 9183).

This is the most robust species of the Flicatula group.

44. PASPALUM COMPRESSIFOLIUM Swallen, sp. nov.

Culmi erecti, compressi, 40 cm. alti; laminae 3 mm. latae, conduplicatae, glabrae, marginibus scabrae;

racemi 4-6, adscendentes, 3-5 cm. longi; spiculae binae, 2.5-2.6 mm. longae, 2 mm. latae, ellipticae, glabrae vel gluma secunda pubescens; fructus atrobrunneus, minute striatus.

Perennial; culms erect, flattened, about 40 cm. tall; sheaths crowded toward the base, 3-8 cm. long, the culm sheaths elongate, conspicuously flattened and keeled, glabrous, the basal ones as much as 8 mm. wide as folded; ligule brown, membranaceous, 1 mm. long; blades conduplicate, gradually narrowed from the base, as much as 3 mm. wide as folded, glabrous except for the scabrous margins; racemes 4-6, ascending, 3-5 cm. long, the rachis 0.8 mm. wide, long-pilose in the axils, the margins scabrous; spikelets in pairs 2.5-2.6 mm. long, 2 mm. wide, elliptic, glabrous, or the second glume more or less pubescent; pedicels short and thick, about 0.5 mm. wide at the summit; fruit dark brown, finely striate-roughened.

Type in the U. S. National Herbarium, No. 1961358, collected in wet ground, margin of banhado, Fazenda da Brigada, Passo Fundo, Rio Grande do Sul, Brazil, December 19, 1945, by Jason R. Swallen (No. 7790).

The following specimens seem to belong to this species although the sheaths are not so conspicuously equitant. Brazil: Rio Grande do Sul: Passo Fundo, Swallen 8012. Paraná: Ponta Grossa, Swallen 8318; Pereira 5200, 5252. Santa Catarina: Lajes, Reitz & Klein 13965, 14065; Caçador, Klein 3551; S. Joaquim, Reitz & Klein 7881; Santa Cecilia, Reitz & Klein 14146.

45. PASPALUM VALIDUM Swallen, sp. nov.

Culmi grossi, erecti, 1.5 m. alti; laminae usque 50 cm. longae, 1-1.5 cm. latae, prope margines pilosae vel hispidae; racemi 18, adscendentes vel patentes, infimus ca. 9 cm. longus; spiculae binae, 2.5-2.7 mm. longae, 1.5 mm. latae, pedicellis scabris usque 1.5 mm. longis; gluma secunda sparse pilosa, fructu paulo brevior; fructus fuscus, lucidus.

Culms coarse, erect, 1.5 m. tall; sheaths broad, very loose, compressed, keeled, the lower ones 3-12 cm. long, glabrous or sparsely pubescent; ligule 0.5-1 mm. long, entire, the junction with the sheath and blade well marked; blades as much as 50 cm. long, 1-1.5 cm. wide, usually pilose near the margins, or sometimes sparsely hispid; inflorescence 22 cm. long, pyramidal, composed of 18 ascending or spreading racemes, the lowermost about 9 cm. long; rachis 0.7-0.9 mm. wide, scabrous on the margins; spikelets in pairs, 2.5-2.7 mm. long, 1.5 mm. wide, on slender, very scabrous pedicels, as much as 1.5 mm. long; second glume sparsely pilose, a little shorter than the fruit, the sterile lemma glabrous, equaling the fruit; fruit dark reddish brown, shining.

Type in the U. S. National Herbarium, No. 1613226, collected at base of rocky slope, in chapada, between Grajahú and Porto Franco, Maranhão, Brazil, March 8-13, 1934, by Jason R. Swallen (No. 3784).

46. PASPALUM VIALE Swallen, sp. nov.

Culmi erecti, 55-80 cm. alti, glabri; laminae ca. 20 cm. longae, 2-4 mm. latae, acuminatae, pilosae; racemi 3-5, adscendentes, inferiores 10 cm. longi; spiculae 2.8-2.9 mm. longae, 1.8 mm. latae, ellipticae; gluma secunda et lemma sterile atroferruginea, lucida. glabra.

Perennial; culms tufted, erect, glabrous, 55-80 cm. tall; sheaths all longer than the internodes, densely pilose with spreading hairs as much as 5 mm. long; ligule 3-4 mm. long; blades about 20 cm. long, 2-4 mm. wide, gradually narrowed to the base, acuminate, pilose like the sheaths; inflorescence partly enclosed in the elongate upper sheath, composed of 3-5 ascending racemes, the lower ones 10 cm. long, the rachis 1 mm. wide, scabrous on the margins; spikelets 2.8-2.9 mm. long, 1.8 mm. wide, elliptic on scabrous pedicels 0.5-1 mm. long; second glume and sterile lemma dark reddish brown, both rather prominently cross-wrinkled, shining, glabrous; fruit dark brown, smooth and shining, the back of the lemma evenly raised.

Type in the U. S. National Herbarium, No. 1916368, collected along roadside, Campo Largo, near Curitiba, Paraná, Brazil, February 15, 1946, by Jason R. Swallen (No. 8591).

This species is definitely related to Paspalum pannuceum Swallen, which differs in being nearly glabrous and in having larger spikelets. Both species have the evenly spaced nerves on the second glume, and the fruit evenly curved on the back.

47. PASPALUM OTEROII Swallen, sp. nov.

Culmi decumbentes, patentes, nodis radicantes, glabri, usque 1.5 m. longi; laminae 6-15 cm. longae, 3-5 mm. latae, acuminatae, marginis scabrosae; racemi 4 vel 5, adscendentes vel appressi; spiculae binae, ellipticae, dense pubescentes: fructus 2.8 mm. longus, atrobrunneus, lucidus.

Perennial; culms decumbent-spreading, stolon-like, rooting at the nodes, glabrous, as much as 1.5 m. long; internodes of nearly equal length, 6-10 cm. long, the sheaths 1/2-1/3 as long; blades 6-15 cm. long, 3-5 mm. wide, acuminate, nearly glabrous, or more or less papillose-pilose toward the base, the white margins very scabrous; racemes 4 or 5, ascending or appressed, the rachis 1 mm. wide; spikelets in pairs, elliptic, 3 mm. long, very densely pubescent; fruit 2.8 mm. long, dark brown, shining.

Type in the U. S. National Herbarium, No. 1982726, collected at the Secção Experimental de Agrostologia, Rio de Janeiro, Brazil, by Jorge Ramas de Otero, February 15, 1950. Grown from seed from the Pantanal, Mato Grosso, where it is considered to be a good forage grass. It is easily propagated by cuttings.

Anachyris

48. PASPALUM PLANIUSCULUM Swallen, sp. nov.

Culmi erecti, 160 cm. alti, compressi, pilosi, nodis dense villosis; laminae usque 65 cm. longae, 1.5 mm. latae, infra pilosae, supra glabrae, marginibus scabrae et hispidae, superiores 15 cm. longae, 2 cm. latae; racemi ca. 40, adscendentes vel patentibus, infimus usque 6-7 cm. longus; spiculae 1.6 mm. longae, 0.8 mm. latae, glabrae; fructus albus.

Perennial; culms erect, 160 cm. tall, conspicuously flattened, apparently soft and spongy, appressed to spreading pilose, the nodes densely villous with ascending hairs; sheaths much longer than the internodes, compressed, keeled, as much as 38 cm. long, appressed-pilose or the uppermost nearly glabrous; blades as much as 65 cm. long, 1.5 mm. wide, about half the length narrowed, petiole-like, pilose beneath, glabrous above, scabrous and hispid on the margins, the upper ones about 15 cm. long, 2 cm. wide, with a dense tuft of hairs just above the ligule; inflorescence 30 cm. long, composed of about 40 ascending or spreading racemes, the lowest as much as 6-7 cm. long, the rachis 0.7-1 mm. wide, scabrous on the margins; spikelets 1.6 mm. long, 0.8 mm. wide, glabrous, the fruit white.

Type in the U. S. National Herbarium, No. 1613026, collected in brushy border of forest between Grajahú and Porto Franco, Maranhão, Brazil, March 8-13, 1934, by Jason R. Swallen (No. 3841). This species is characterized by the conspicuously flattened culms, and the elongate sheaths and basal portion of the blades.

49. PASPALUM TENUIFOLIUM Swallen, sp. nov.

Culmi erecti nodis inferioribus ramosi, 1.5 m. alti, nodis dense villosis; laminae tenues, 9-40 cm. longae, 1.5-3 cm. latae, infra pubescentes, marginibus scabrae; racemi 45, adscendentes, infimus 9 cm. longus; spiculae 1.6-1.7 mm. longae, 0.8-1 mm. latae, pedicellis gracilibus 0.5-1 mm. longis.

Annual; culms erect, branching at the lower nodes, 1.5 m. tall, the nodes densely villous; sheaths about as long as the internodes, papillose-pilose with spreading hairs; blades thin, 9-40 cm. long, 1.5-3 cm. wide, the lower narrowed to the base, pubescent on the under surface, glabrous above, the margins very scabrous, with a dense tuft of long hairs above the ligule;

inflorescence about 22 cm. long, composed of nearly 45 ascending racemes, the lower 9 cm. long, the rachis 1 mm. wide, the margins scabrous; spikelets 1.6-1.7 mm. long, 0.8-1 mm. wide, on slender pedicels 0.5-1 mm. long.

Type in the U. S. National Herbarium, No. 1612692, collected on wet banks along ditch, Caxias to Barra do Corda, Maranhão, Brazil, February 18-26, 1934, by Jason R. Swallen (No. 3602). This species also was collected between Barra do Corda and Grajahú, Maranhão, Swallen (No. 3766), and between Carolina and San Antonio de Balsas, Maranhão, Swallen (No. 4017).

50. PASPALUM COSTELLATUM Swallen, sp. nov.

Culmi gracillimi, 12-28 cm. alti, erecti, glabri, nodis inferioribus ramosi; laminae usque 6 cm. longae, 4-8 mm. latae, hispido-ciliatae, infra et supra hirsutae; racemi 3-6, patentes usque 2.5 cm. longi; spiculae solitariae, interdum binae, 1.3 mm. longae, glabrae.

Annual; culms very slender, erect, glabrous, branching at the lower nodes, 12-28 cm. tall; sheaths mostly shorter than the internodes, keeled, glabrous or nearly so; blades as much as 6 cm. long, 4-8 mm. wide, hispid-ciliate, appressed-hirsute on both surfaces; racemes 3-6, spreading, up to 2.5 cm. long, the rachis 1-1.3 mm. wide, scabrous on the margins; spikelets mostly solitary, sometimes in pairs, 1.3 mm. long, glabrous; fruit white.

Type in the U. S. National Herbarium, No. 1613883, collected in chapada, Carolina to San Antonio de Balsas, Maranhão, Brazil, March 20-25, 1934, by Jason R. Swallen (No. 3955). This species was collected in 1962 by Eiten & Eiten, in chapada near "Grota Grande," trail to Santa Bárbara, Municipio de Loreto, Maranhão.

51. PASPALUM EITENII Swallen, sp. nov.

Culmi graciles, erecti vel adscendentes, 55-100 cm. alti, glabri, straminei; laminae elliptico-lanceolatae, 4-16 cm. longae, 6-15 mm. latae, basi longipilosae; racemi 7-13, patentes, infimus usque 6 cm. longus; spiculae 1.4-1.6 mm. longae, 0.7-0.8 mm. latae, glabrae; fructus albus vel stramineus; lemma fertile valde 5-nerve.

Annual; culms slender, erect or ascending, 55-100 cm. tall, soft, glabrous, straw-colored, shining; sheaths all shorter than the internodes, glabrous, the uppermost elongate; blades elliptic-lanceolate, 4-16 cm. long, 6-15 mm. wide, acute, gradually narrowed to the base, with long dense hairs just above the ligule, the margins scabrous, otherwise glabrous; inflorescence 9-12 cm. long, composed of 7-13 spreading racemes, the lower up to 6 cm. long, the rachis 0.7 mm. wide, glabrous on the back, the margins scabrous; spikelets 1.4-

1.6 mm. long, 0.7-0.8 mm. wide, glabrous, the pedicels about 0.5 mm. long; fruit white or light yellow, the lemma strongly 5-nerved.

Type in the U. S. National Herbarium, No. 2434291, collected in ravine of dry brook in extensive "caatinga" forest, between Rios Balsas and Parnaíba, "Ilha de Balsas" region, Municipio de Loreto, Maranhão, Brazil, April 6, 1962, by George Eiten and Liene T. Eiten (No. 4091).

This species was also collected in the same region by Eiten & Eiten (Nos. 3901, 3980, 4078, 4089, and 4273).

Additional material examined: Brazil: Maranhão: Serra da Malicia, near Carolina, Pires & Black 2293; Barra do Corda to Grajahú, Swallen 3706, 3770; Carolina to San Antonio de Balsas, Swallen 3955; Piaui: Swallen 4207; Ceará: Crato to Barbalha, Swallen 4374; Baturité to Guaramírango, Swallen 4428.

These specimens have been referred to Paspalum malacophyllum Trin., which is a perennial species, much different from P. eitenii.

Ungrouped

52. PASPALUM CLANDESTINUM Swallen, sp. nov.

Culmi erecti vel adscendentes, 13-28 cm. alti, glabri; laminae 3-7 cm. longae, 4-7 mm. latae, dense pilosae pilis 2 mm. longis; racemus solitarius, tectus, 10 cm. longus; rhachis 1 mm. lata, marginibus scabra; spiculae solitariae 3 mm. longae, 1.5 mm. latae, ovatae, acutae; gluma secunda et lemma sterile maculata, 3-nervia, villosa; fructus 2.5 mm. longus, plano-convexus, ellipticus, pallidus, minute striatus.

Annual; culms erect or ascending, 13-28 cm. tall, glabrous; sheaths all longer than the internodes, glabrous on the back, sparsely to densely pilose on the margins and toward the summit; blades 3-7 cm. long, 4-7 mm. wide, erect or ascending, rather firm, densely pilose with white hairs about 2 mm. long; raceme solitary, almost entirely enclosed in the sheath, about 10 cm. long, slightly arcuate, the rachis about 1 mm. wide, minutely scabrous on the margins; spikelets solitary, 3 mm. long, 1.5 mm. wide, ovate, acute, the first glume 0.5 mm. long, thickened, the second glume and sterile lemma aduate to it; second glume and sterile lemma spotted, equal, 3-nerved, the lateral nerves marginal, lightly covered with white silky hairs; fruit 2.5 mm. long, plano-convex, broadly elliptic, pale, minutely striate.

Type in the U. S. National Herbarium, No. 1613861, collected in low chapada between Carolina and San Antonio de Balsas, Maranhão, Brazil, March 20-25, 1934, by Jason R. Swallen (No. 4064).

The raceme may be exserted later, but the spikelets do look mature.

53. PASPALUM SCHULTESII Swallen, sp. nov.

Culmi dense caespitosi, erecti, 16-35 cm. alti, glabri; laminae involutae, usque 25 cm. longae, supra dense scabro-pubescentes, infra scabrae; racemi 2, conjugati, adscendentes vel appressi, 1.5-3 cm. longi; spiculae obovatae, acutae, brunneae; pedicelli compressi, ciliati, 1 mm. longi; gluma secunda et lemma sterile teuissima, nervis inconspicuis; fructus obovatus, atrobrunneus, lucidus.

Perennial; culms very densely tufted, erect, 16-35 cm. tall, glabrous; sheaths variously pilose especially at the summit and toward the base, the hair golden, appressed; ligule 0.5 mm. long, decurrent; blades involute, as much as 25 cm. long, usually much shorter, densely scabrous, pubescent on the inner surface, glabrous on the outer, sometimes curved or flexuous; racemes 2, conjugate, ascending or appressed, 1.5-3 cm. long, the rachis glabrous, even on the margins; spikelets ovate, acute, brown, on flattened. ciliate pedicels 1 mm. long; second glume and sterile lemma very fragile, the midnerve suppressed, the marginal nerves faint; fruit obovate, dark brown, smooth and shining.

Type in the U. S. National Herbarium, No. 2150293, collected near the Rio Paraná Pichuna (tributary of Rio Vaupés), Vaupés, Colombia, June 1953, by Richard Evans Schultes and Isidoro Cabrera (No. 19934).

This species does not belong to any group of Paspalum known. It is characterized by the involute blades and two conjugate racemes of brown spikelets.

54. PASPALUM FROESIANUM Swallen, sp. nov.

Culmi grossi, erecti, ca. 1 m. alti; laminae planae, 30-40 cm. longae, 8-12 mm. latae, acuminatae, dense pilosae, vetae crispescentes; racemi 12, appressi, inferiores remoti, 9 cm. longi; spiculae 2.5-2.7 mm. longae, ellipticae, pedicellis 3-4 mm. longis; gluma prima evidens, ciliata; gluma secunda spicula paulo brevior, appresso-pilosa; sterile lemma spiculam aequans, appresso-pilosum; fructus pallidus.

Perennial; culms rather coarse, erect, more than 1 m. tall; sheaths longer than the internodes, hispid or papillose-hispid with long appressed hairs, becoming shorter on the uppermost nearly bladeless sheaths; ligule a brown membranaceous rim 0.1 mm. long; blades flat, 30-40 cm. long, 8-12 mm. wide, acuminate, densely pilose on both surfaces, the margins papillose-hispid-ciliate, the older ones becoming more or less curled at the base of the culms; panicle 23 cm. long, composed of 12 closely appressed racemes, the lower distant, 9 cm. long, becoming shorter and more crowded toward the tip; spikelets 2.5-2.7 mm. long, elliptic, on pedicels 3-4 mm. long; first glume evident, ciliate; second glume a

little shorter and narrower than the fruit, appressed-pilose; sterile lemma as long as the fruit, appressed-pilose especially on the margins; fruit pale.

Type in the U. S. National Herbarium, No. 2205975, collected on the Macapá-Clevelandia road, km. 120, Territorio do Amapá, Brazil, July 22, 1951, by G. A. Black and R. L. Fróes (No. 51-12357).

55. PASPALUM TELMATUS Swallen, sp. nov.

Culmi dense caespitosi, erecti, 50-60 cm. alti, glabri; laminae firmae, erectae, acuminatae, 20-30 cm. longae, 3-6 mm. latae, dense appresso-pilosae; racemi 5-7, rigide adscendentes, 3-5 cm. longi; spiculae 3 mm. longae, 1.3-1.5 mm. latae, acutae; gluma secunda et lemma sterile tenuia, glabra, fructu 0.5 mm. longiora; fructus 2.5 mm. longus, pallidus, obovatus.

Perennial; culms in dense tufts, erect, 50-60 cm. tall, glabrous; ligule a very short glabrous rim; sheaths mostly crowded toward the base, of nearly equal length, compressed, keeled, densely appressed-pilose; blades firm, strictly erect, acuminate-pointed, 20-30 cm. long, 3-6 mm. wide, densely appressed-pilose; inflorescence 6-8 cm. long, composed of 5-7 stiffly ascending racemes, 3-5 cm. long, with a few hairs in the axils, the rachis 0.7 mm. long; spikelets 3 mm. long, 1.3-1.5 mm. wide, acutish, on slender glabrous pedicels 0.5-1 mm. long; second glume and sterile lemma thin, glabrous, pointed beyond the fruit 0.5 mm., the glume with the lateral nerves very close together; fruit 2.5 mm. long, pale, slightly obovate, rounded.

Type in the U. S. National Herbarium, No. 1500550, collected on wet sandy margin of lake, Logoinhes, between Campo Grande and Dourados, Mato Grosso, Brazil, by Agnes Chase (No. 10926).

56. PASPALUM REDONDENSE Swallen, sp. nov.

Culmi erecti, 55-60 cm. alti, glabri, rhizomatibus curtis; laminae firmae, planae, erectae, 6-10 cm. longae, 1.5-2.5 mm. latae, sparse papillosae vel papilloso-pilosae pilis 2-3 mm. longis; racemi 4-6, adscendentes, inferiores usque 7 cm. longi; spiculae 2.8 mm. longae, 1.4 mm. latae; gluma secunda et lemma sterile tenuia, 3-5-nervia, glabra; fructus pallidus, lucidus, minute striatus.

Perennial; culms erect from a short rhizome-like base, 55-60 cm. tall, glabrous; sheaths shorter than the internodes, the lowermost appressed-pilose at the base, the rest glabrous or with a few appressed hairs on the margins; blades firm, flat, erect, 6-10 cm. long, 1.5-2.5 mm. wide, with a few widely spaced large papillae, or papillose-ciliate, the hairs spreading, 2-3 mm. long; inflorescence 5-7 cm. long, composed of 4-6 ascending racemes, the lower as much as 7 cm. long,

long-pilose in the axils; spikelets 2.8 mm. long, 1.4 mm. wide, the second glume and sterile lemma rather thin, 3-5-nerved, glabrous; fruit pale, smooth and shining, minutely striate.

Type in the U. S. National Herbarium, No. 1961595, collected in shallow soil on rock outcrops, Fazenda Capão Redondo, Guarapuava, Paraná, Brazil, March 20-23, 1946, by Jason R. Swallen (No. 8837). Swallen 8844, collected at the same locality, belongs to this species.

57. PASPALUM MORULUM Swallen, sp. nov.

Culmi erecti, 35-60 cm. alti, glabri; laminae 15-20 cm. longae, 2-5 mm. latae, acuminatae, papilloso-pilosae; racemi 2-4, adscendentes, 1-3 cm. longi; spiculae binae, 2.4 mm. longae, 1.8 mm. latae, plano-convexae, 1.5 mm. crassae, fructus pallidus, lucidus.

Annual; culms erect, 35-60 cm. tall, glabrous; sheaths longer than the internodes, papillose-pilose with spreading hairs 5-7 mm. long; ligule truncate, short, glabrous; blades 15-20 cm. long, 2-5 mm. wide, papillose-pilose like the sheaths, becoming glabrous toward the acuminate tip; inflorescence 2-6 cm. long, composed of 2-4 spreading racemes 1-3 cm. long, with a few long hairs on the margins of the rachis and in the axils; spikelets in pairs, 2.4 mm. long, 1.8 mm. wide, plano-convex, 1.5 mm. thick, slightly obovate, rounded, mottled, light-colored, finally turning to a deep brown or black; fruit the same size and shape as the spikelet, pale, smooth and shining.

Type in the U. S. National Herbarium, No. 2434293, collected along open dry rocky trail through low "chapada" from Loreto to Fazenda Aldeia, Maranhão, Brazil, April 11, 1962, by George Eiten & Liene T. Eiten (No. 4250).

58. PASPALUM SWALLENII Chase, sp. nov.

A P. morulo Swallen, racemis brevioribus et spiculis brevioribus 1.5-1.6 mm. longis differt.

Similar in all respects to P. morulum Swallen, except for the shorter racemes and smaller spikelets, the latter 1.5-1.6 mm. long.

Type in the U. S. National Herbarium, No. 2238406, collected in red sandy loam in chapada between Carolina and San Antonio de Balsas, Maranhão, Brazil, March 20-25, 1934, by Jason R. Swallen (No. 4100).

This specimen was indicated by Mrs. Chase as a new species many years ago, but no description was ever written.

BOOK REVIEWS

Alma L. Moldenke

"Wild Flowers of the United States", Volume I the Northeast States Parts 1 & 2 by Harold William Rickett, x, vi, & 559 pp., illus., New York Botanical Garden and McGraw-Hill Book Company, New York City, New York. $39.50. 1966.

Irresistibly I have spent hours upon hours joyfully admiring this work of beauty, scientific accuracy and thoroughness. Many more will be so spent by myself and all folks, regardless of their age or education, who happen to open these two magnificent books. And this volume is to be followed at yearly intervals or less by four more covering other areas of our country under the same well trained group of botanical collaborators.

This volume alone covers more than 1,700 species which is more than half of the known total of wild flowering species, excluding the grasses, sedges, rushes, eriocauls and woody plants. Might it have been wise to include at least one conspicuous member of each of these inconspicuously flowered, but very abundant, groups so that amateurs would be confronted with such structures as their flowers? There are over 1,200 exquisitely reproduced color photographs usually taken in situ for easier identification: they are the glory of the book with artistic credit to each of the 51 contributing nature photographers, including the author. There are 350 helpful line drawings. The text is simple to read and has large clear print. There is a glossary with clearcut definitions. There is a readily manageable key to 14 groups of 87 plant families considered and then further keys to genera and species. Both the common and scientific names are listed, and in the introduction they are wisely explained for the amateur. The region covered is from Maine to Minnesota south to Missouri and Virginia.

The price is modest considering the size (9 7/8 x 13 1/4), the superior paper and type, the quality photographic reproductions, and the research essential for so large an undertaking. Actually, the price is partially subsidized by the David Rockefellers to whom the work is dedicated and some foundations.

"Die grossartige Weld der Sukkulenten" by Werner Rauh. 184 pp., 730 illustrations (62 in color). Verlag Paul Parey, Hamburg & Berlin, Germany. 98 DM. 1967.

Succulents have always been favorites among garden enthusiasts because of their bizarre appearance and often extremely handsome flowers. Among these the Cactaceae are the best known and most popular, but these are not included in this book. There are hundreds of succulents in other plant families and it is with these that the present work is concerned. Many of these non-cacti

are very often mistaken for and confused with true cacti by the uninitiated.

The author divides his subject into stem-succulents and leaf-succulents. In the former group he discusses 50 genera in the Apocynaceae, Asclepiadaceae, Compositae, Crassulaceae, Cucurbitaceae, Didieriaceae, Euphorbiaceae, Fouquieriaceae, Geraniaceae, Icacinaceae, Moraceae, Passifloraceae, Pedaliaceae, and Vitaceae. In the second group he discusses 66 genera in the Compositae, Crassulaceae, Cucurbitaceae, Liliaceae, Mesembryanthemaceae, and Portulacaceae. One wonders why Agave, the xerophytic bromeliads, and some of the alpine saxifrages are ignored. Beach plants, like Cakile, Mallotonia, Ipomoea pes-caprae, Salicornia, and species of Achyranthes are also certainly succulent, but are not included in the book. The entire begonia family is ignored,

An interesting map is provided showing the desert, semi-desert, and semi-arid regions of the earth. The illustrations are magnificent! A few cacti are illustrated as examples of parallel evolution. Some pests and diseases of succulents are also illustrated and discussed. A valuable chart tells us the months when watering of the plants in cultivation is recommended and the months when it should by all means be avoided. On color plate 2 the first use of the word "Euphorbia" has been placed in the wrong font of type.

There is much of valuable learning and beauty that can be gleaned from and enjoyed in this beautifully printed and illustrated work.

"The Origin of Cultivated Plants" by Franz Schwanitz, translated from the German by Gerd von Wahlert, vi & 175 pp., illus. Harvard University Press, Cambridge, Massachusetts, and Oxford University Press, London. 1966. $4.75

Harvard has rendered another fine service to the field of the biological sciences in bringing this valuable study to the general and scientific English reading public.

The author shows clearly that the transition from the wild species to the corresponding but distinct cultivated ones is due primarily to gigantism with its concomitant cell size increase caused by polyploidy. In central Europe 48.6 percent of higher plant species is polyploid with an even higher percentage in cultivated plants and with 8.8 percent having both non-polyploid and polyploid races. Through selective breeding there is also a disproportionate increase in the size of the utilized plant organs effected by an increase in the genes in the same or in repeated chromosomes as in edible drupes and pomes. "There is hardly a plant organ that man has not utilized and, in the course of time, transformed to make its usefulness as great as possible."

Reporting the recent experimental work on chromosome study and breeding of lupines in Germany, the author illustrates how long cultivated plants probably evolved from wild species into cultivated forms as the cultivated traits appeared one after another

through gene mutations and correspondingly how the wild traits gradually disappeared.

He gives a striking example of how a somatic mutation inducing an increase in cell size caused the formation of doubled flowers simultaneously in a mixed head of Callistephus chinensis.

He stresses the importance of Vavilov's eight gene centers in the world in subtropical and tropical mountainous areas because of their greater temperature ranges, their exposure to stronger ultra-violet light, and their tremendous range in microclimates would increase the mutations and would establish more rapidly the successful ones with wild plant characteristics inherited mainly as dominant traits in the centers of such areas, and with the cultivated ones inherited mainly as recessive traits on the peripheries.

This book is crammed with valuable ideas and supporting facts presented in easy, direct language, and is well illustrated.

"Gymnosperms — Structure and Evolution" by Charles Joseph Chamberlain, xi & 484 pp., illus., paperback republication of original University of Chicago Press 1935. Dover Publications, New York City, New York 10014. 1966. $2.75

This unabridged reprinting puts this classic back in circulation so that today's botany students can learn from its excellent 397 illustrations and detailed text the anatomy, the life histories with their expanding sporophytes alternating with their shrinking gametophytes, the fossil records and the evolution of gymnosperms. The first part of the book deals with the ancient Cycadofilicales (misspelled on the back cover) and Bennettitales and their related modern cycads. The second part deals with the ancient Cordaitales and their related modern Ginkgoales, conifers, Gnetales, and the fantastic Welwitschia.

The bibliography is the most detailed one in print up to the date of the original publication.

The publisher gives assurance that the binding is sewn and durable.

"Drawings of British Plants — Being Illustrations of the Species of Flowering Plants Growing Naturally in the British Isles" by Stella Ross-Craig, Part XXIII Scrophulariaceae (2), Orobanchaceae, Lentibulariaceae, Verbenaceae. 38 plates. G. Bell and Sons, Ltd., London. 1966. 12 sh. 6 d.

The same high quality of accurate and attractive black-and-white line drawings is shown in this work as in the previous parts. There is an index. Time lapses between the appearance of parts is reasonably short.

PHYTOLOGIA

Designed to expedite botanical publication

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MISSOURI BOTANICAL

MAY 15 1967

GRASSES NEW TO EASTERN UNITED STATES

BY

CLYDE F. REED*

The following species of grasses seem to be new to the flora of Eastern United States. The specimens have been determined by Dr. Jason Swallen, Division of Grasses, United States National Herbarium. All the specimens are in the Reed Herbarium, unless noted otherwise.

Andropogon traceyi Nash South Carolina: Roadsides, Sharon, York Co. Dec. 26, 1955. Reed 37164.

Eragrostis oxylepis (Torr.) Torr. Virginia: Wastes at Fort Monroe, Hampton. Common in the sandy lawns. Elizabeth Co. Nov. 15, 1959. Reed 45919. Also in US.

Festuca dertonensis (All.) Aschers. & Graebn. Delaware: Edge of woods just east of Noxentown, New Castle Co. June 13, 1960. Reed 47196. Also in US.

Heleochloa schoeniodes (L.) Host. Delaware: Wharves, New Castle, New Castle Co. Oct. 21, 1863. Albert Commons. (Reed Herb.).

Many records for species of grasses new to Eastern United States were published by the author in 1964 (Phytologia, 10(5); 321-406) and 1965 (Phytologia, 11(5): 289).

* Reed Herbarium, 10105 Harford Road, Baltimore, Maryland, 21234.

ADDITIONAL NOTES ON THE GENUS PRIVA. V .

Harold N. Moldenke

PRIVA Adans.

Additional bibliography: Moldenke, Phytologia 5: 22, 26, 31, 61—73, 75—79, 95, 98, 105, 107—111, & 511 (1957), 6: 232, 234, 235, 239, & 242 (1958), and 6: 511. 1959; Srinivasan & Agarwal, Bull. Bot. Surv. India 5: 68. 1963; S. V. Ramaswamy, Bull. Bot. Surv. India 6: 17. 1964; Moldenke, Phytologia 14: 336—357. 1967.

PRIVA ADHAERENS (Forsk.) Chiov.

Additional bibliography: Moldenke, Phytologia 14: 338—339 & 346. 1967.

PRIVA ASPERA H.B.K.

Ton found this species growing on a slope with Quercus, Pinus, and Liquidambar.

Additional citations: MEXICO: Chiapas: A. S. Ton 372 (Ws).

PRIVA CORDIFOLIA (L. f.) Druce

Additional bibliography: Srinivasan & Agarwal, Bull. Bot. Surv. India 5: 68. 1963; S. V. Ramaswamy, Bull. Bot. Surv. India 6: 17. 1964; Moldenke, Phytologia 14: 338 & 345—348. 1967.

Ramaswamy (1964) states that this plant grows in hedges along roadsides in India.

PRIVA CURTISIAE Kobuski

Additional bibliography: Moldenke, Phytologia 14: 343, 347, & 348. 1967.

PRIVA LAPPULACEA (L.) Pers.

Additional bibliography: Moldenke, Phytologia 14: 345 & 350—389. 1967.

Additional citations: MEXICO: Oaxaca: Martínez-Calderón 744 (Mi). COLOMBIA: Magdalena: H. H. Smith 1465 (Mi). BRAZIL: Mattogrosso: F. C. Hoehne Com. Rondon 5698 (W—1199577). Pará: Dahlgren & Sella 134 (F—603315, W—1471345); D. A. Lima 53-1294 (Be—80833). BOLIVIA: El Beni: H. H. Rusby 1784 (W—43521, Ws). La Paz: M. Bang 1375 (E—118800, W—43520); H. H. Rusby 698 (D—645881, W—1284155). GHANA: J. B. Hall 2517 (S). INDONESIA: GREATER SUNDA ISLANDS: Java: Den Berger 792 (Ca—236030). LOCALITY OF COLLECTION UNDESIGNATED: Herb. A. Gray 157 (E—118767). MOUNTED ILLUSTRATIONS: Kobuski drawing 10 (E—925406), 19 (E—925405).

PRIVA MEXICANA (L.) Pers.

Additional & emended synonymy: Verbena mexicana trachelii folio, fructu aparines Dill., Hort. Eltham. 407—408, pl. 302, fig. 389.

1732. Verbena mexican. J. A. Murr. in L., Syst. Veg., ed. 13, 62. 1774. Verbena diandra, spic. laxis, calyc. fructus reflexis rotundato-didymis hispidis J. A. Murr. in L., Syst. Veg., ed. 13, 62. 1774. Verbena diandra, spicis laxis, calycib. fructus reflexis rotundato-didymis hispidis L. apud H. E. Richter, Cod. Bot. Linn. 35. 1835. Verbena mexicana, trachelii fol., fructu aparines Dill. apud H. E. Richter, Cod. Bot. Linn. 35, in syn. 1835. Verbena mexicana, trachelii fol. etc. Dill. apud Peterm., Cod. Bot. Linn. Ind. Alph. 196, in syn. 1840. Verbena mexicana Pers. ex Steud., Nom. Bot., ed. 2, 2: 750, in syn. 1841. Blairia mexicana Gaertn. apud Bocq., Adansonia 3: 239. 1863. Priva mexicana Pers. apud Benth. in Benth. & Hook. f., Gen. Pl. 2 (2): 1145. 1876 [not P. mexicana Sieber, 1841]. Drepania mexicana Pers. ex Moldenke, Phytologia 5: 108, in text. 1954. Verbena uncinata Waterfall ex Moldenke, Résumé Suppl. 3: 41, in syn. 1962. Priva spicata A. L. Juss. ex Langman, Select. Guide Lit. Flow. Pl. Mex. 1010, in text. 1964. Priva mexicana (L.) D. Don, in herb.

Additional & emended bibliography: Dill., Hort. Eltham. 407—408, pl. 302, fig. 389. 1732; L., Syst. Nat., ed. 10, 852. 1759; J. A. Murr. in L., Syst. Veg., ed. 13, 62. 1774; Dill., Hort. Eltham. Add. Denom. Linn. pl. 302. 1774; Christm. & Panzer, Vollst. Pflanzensyst. Houttuyn 5: 122. 1779; A. L. Juss., Ann. Mus. Nat. Hist. Paris 7: 69. 1806; M. Mirbel, Ann. Mus. Nat. Hist. Nat. Paris 15: 260, pl. 14 (2), fig. 2. 1810; Dum. Cours., Bot. Cult., ed. 2, 2: 622—623. 1811; J. Sm. in Rees, Cycl. 36: no. 1. 1817; H. E. Richter, Cod. Bot. Linn. 35. 1835; Peterm., Cod. Bot. Linn. Ind. Alph. 196. 1840; Steud., Nom. Bot., ed. 2, 2: 750. 1841; Walp., Repert. 4: 34. 1845; Bocq., Adansonia 2: 94—96 (1863) and 3: 239. 1863; Bocq., Rev. Verbenac. 94—96 & 239. 1863; Jacks. in Hook. f. & Jacks., Ind. Kew. 2: 628. 1894; M. Kunz, Anatom. Untersuch. Verb. 55. 1911; Loes., Verh. Bot. Ver. Brand. 53: 80 [Abhandl. 245]. 1912; Britton & P. Wils., Scient. Surv. Porto Rico 6: 145. 1925; Stapf, Ind. Lond. 6: 430. 1931; J. Rzedowski, Anal. Esc. Nac. Cienc. Biol. 8: 105. 1954; J. Rzedowski, Ciencia 15: 146, 147, & 150. 1955; Hocking, Dict. Terms Pharmacog. 128. 1955; J. Rzedowski, Anal. Inst. Biol. Mex. 27: 198. 1956; J. & G. C. Rzedowski, Act. Cient. Potos. 1: 50. 1957; Moldenke, Résumé 30, 38, 42, 55, 62, 222, 237, 279, 340, 362, 370, 394, & 468. 1959; Langman, Select. Guide Lit. Flow. Pl. Mex. 402 & 1010. 1964; Moldenke, Résumé Suppl. 12: 12. 1965; Moldenke, Phytologia 14: 341. 1967.

Illustrations: Dill., Hort. Eltham. pl. 302, fig. 389. 1732; Dill., Hort. Eltham. Add, Denom. Linn. pl. 302. 1774; M. Mirbel, Ann. Mus. Nat. Hist. Nat. Paris 15: pl. 14 (2), fig. 2. 1810.

Recent collectors describe this plant as an upright perennial herb or bushy shrub, 0.1—1 m. tall, "sticky", with several virgate stems from the base and "panicles of long spikes", the fruit easily detached, adhesive. They have found it growing in open matorral, open shrubbery, and wet spots, in Myrtillocactus associ-

ation, and in steep south-facing Quercus woodlands with occasional Pinus, Arbutus, Ceanothus, Mimosa, Erythrina, etc., along the open border of oak forests, on oak flats, tufaceous monadnocks, rocky basalt, limestone cliffs and slopes, wooded slopes, steep slopes with Quercus, dry grazed slopes with Agave, Opuntia, Acacia, and Solanum polyadenium, and on brush-covered hills among shrubs and small trees of Acacia, Mimosa, and Opuntia, at altitudes of 50 to 2460 meters, flowering from May to October, and fruiting from June to December. Waterfall encountered it near a mountaintop with a few scattered longleaf pines. It has been recorded from the island of St. Thomas, in the West Indies, by Krebs, but apparently in error, according to Britton & Wilson (1925).

The type of Verbena uncinata is Waterfall 12536, collected on grassy flats in Durango, Mexico.

A common name recorded for this plant is "Mexican vervain". The corollas are described as "lilac" on J. A. Steyermark 46287; "pink" on Lundell & Lundell 12351; "purple" on J. Rzedowski 4942; "white" on Breedlove 11410 & 12272 and S. S. White 1566; "white and pink" on Stanford, Lauber, & Taylor 2063; "pinkish-white, mostly white" on Stanford, Lauber, & Taylor 2674; and "purplish-red, the upper lip lined, the tube pale" on R. McVaugh 16665. R. M. King 1967 exhibits leaves and fruiting-calyxes that greatly resemble those of P. lappulacea (L.) Pers., but the cocci are smooth. Possibly it represents a hybrid.

Additional & emended citations: MEXICO: Aguascalientes: R. Mc Vaugh 16665 (Mi). Chihuahua: Correll & Gentry 22770 (Ld); Gentry, Correll, & Arguelles 17962 (Ld); Pringle 1354 (W--57690, W--481216). Coahuila: Edw. Palmer 281 (Ca--139745, E--118805, W--336277); Purpus 1096 (Ca--139742). Durango: E. W. Nelson 4709 (W--332763); Edw. Palmer 578 (Ca--520602, E--118777, E--118778, W--304255); Reko 5304 (F--600913); Shreve 9138 (Ca--731837); Waterfall 12536 (Gg, St), 15376 (Gg). Federal District: Barkley & Rowell 7469 (Au--170035, Ip, Mi); G. L. Fisher s.n. [July 18, 1924] (Vi); Matuda 18875 (W--2397279); Miranda & Barkley 16M958 (N). Guanajuato: Purpus s.n. [Silao] (Ca--520601). Hidalgo: V. H. Chase 7202 (Ur), 7329 (Ur); Pringle 9287 (E--118776, W--396407); Rose & Painter 6642 (W--450198). Jalisco: R. McVaugh 20652 (Mi). México: Arsène 8508 (E--839806, F--484993), 8808 (W--1003437); G. L. Fisher 316 (E--914793, F--555008, W--1207407); Hernandez Corzo & Guzmán s.n. [9.VIII.1963] (Ip); Lundell & Lundell 12351 (Rf, Rf); Matuda 26721 (Z); Orcutt 3628 (E--118910, F--281921, W--567395); Paray 2417 (Ip). Michoacán: Arsène s.n. [Loma Sta. Maria, Aout 28, 1910] (E--844848, W--1003568), s.n. [Jaripeo, July 13, 1911] (E--844841, W--1003569); Iltis, Koeppen, & Iltis 443 (S). Nuevo León: Abbon 242 [Arsène 6178] (W--1003563); Mueller & Mueller 308 (F--683141), 986 (G); S. S. White 1566 (Mi). Oaxaca: Breedlove

12272 (Rf); R. M. King 1967 (N); E. W. Nelson 1822 (W—566114). Puebla: Arsène 96 (W—1003559), 1195 (W—1003558), 1340 (W—1003567), 7054 (W—1003560), 10207 (W—1003311); Nicolas & Arsène 5280 (E—844853, W—1003565); Purpus 2569 (Ca—139741), 3524 (Ca—139740); Ugent & Flores C. 2541 (Ws). Querétaro: Waterfall 14129 (Gg). San Luis Potosí: G. L. Fisher 3343 (W—1589408); F. W. Gould 10810 (Mi); Parry & Palmer 713, in part (E—118783, E—118784, W—43503); Purpus 5518 (Ca—157225, E—118804, W—464002), 5519 (Ca—157215); J. Rzedowski 3800 (Ip), 4942 (Ip), 6280 (Ip). Sonora: H. S. Gentry 1383 (F—766070); S. S. White 2635 (Mi). Tamaulipas: Stanford, Lauber, & Taylor 2063 (Du—453603, Hi—200919, W—2216858), 2674 (Du—453592, W—2216905); Stanford, Retherford, & Northcraft 772 (Ca—713798). Vera Cruz: Bourgeau 3118, in part (F—264560). State undetermined: Foreman 24 (Ok); Herb. Bernhardi s.n. (E—114056). GUATEMALA: Baja Verapaz: Türckheim II.2331 (W—1323154). El Petén: J. A. Steyermark 46287 (N). Sacatepéquez: Breedlove 11410 (Ac). Department undetermined: Tonduz 787 [Brefias] (W—1084758). CULTIVATED: Germany: Hort. Bot. Göttingen s.n. [1795] (E—118773, E—118774); Herb. F. J. Young s.n. (Ws). MOUNTED ILLUSTRATIONS: Kobuski drawing 15 (E—925406), 24 (E—925405).

PRIVA MEYERI Jaub. & Spach

Additional bibliography: Bocq., Adansonia 3: [Rev. Verbenac.] 212. 1863; Jacks. in Hook. f. & Jacks., Ind. Kew. 2: 628. 1894; Moldenke, Phytologia 5: 98 & 110—111. 1954; Moldenke in Humbert, Fl. Madag. 174: 29. 1956; Moldenke, Résumé 143, 145, 149, 151, 154, 340, & 468. 1959; Moldenke, Phytologia 14: 347. 1967.

Rodin describes this as a herbaceous plant, 3 feet tall, the inflated calyx covered with viscid glandular hairs, growing in the strand association with trees and shrubs on the inner beach. Galpin found it on a river bank. Peter found it growing at altitudes of 520 to 1500 meters. The corollas are described as "light-blue" on Rodin 4158 and as "white" on Peter 15509. Wart-like projections are found on the cocci of Barbosa 1151, Junod 277, and Torre 2425. The last-mentioned collection matches well the C. E. Moss 18288 specimen in the herbarium of the British Museum. The species has been collected in anthesis from January to April, as well as in August and November, and in fruit in March, April, and August.

The L. E. Codd 5249 and E. Sousa 5, distributed as this species, are actually P. cordifolia var. abyssinica (Jaub. & Spach) Moldenke. Simão 154 is a mixture with something non-verbenaceous. The Leendertz s.n. [I.09] cited in Phytologia 5: 111 (1954) as deposited in the Britton Herbarium is now in the herbarium of the Conservatoire et Jardin Botaniques at Geneva, Switzerland.

Additional & emended citations: TANGANYIKA: A. Peter 12501 [O. III.156] (B), 15509 [O.IV.14] (B), 51780 [O.I.55] (B). PORTUGUESE EAST AFRICA: Lourenço Marques: Junod 277 (Ul); Rodin 4158 (W—

2063092); Torre 2425 (Ul). Manica e Safala: Barbosa 1151 (Ul); Simão 154, in part (Ul). SOUTH AFRICA: Cape of Good Hope: Bolus 306 (F—439662); Drège a (E—118803—cotype); MacOwan s.n. [Boschberg] (F—46279). Natal: E. E. Galpin 14782 (N).

PRIVA MEYERI var. MADAGASCARIENSIS Moldenke

Additional bibliography: Moldenke, Phytologia 5: 111. 1954; Moldenke in Humbert, Fl. Madag. 174: 29—30. 1956; Moldenke, Résumé 156 & 468. 1959.

PRIVA PEDICELLATA Moldenke

Additional bibliography: Hill & Salisb., Ind. Kew. Suppl. 10: 184. 1947; Moldenke, Phytologia 5: 111. 1954; Moldenke, Résumé 166 & 468. 1959.

PRIVA PERUVIANA Moldenke

Additional bibliography: Hill & Salisb., Ind. Kew. Suppl. 10: 184. 1947; Moldenke, Phytologia 5: 111. 1954; Moldenke, Résumé 84 & 468. 1959.

Additional citations: PERU: Amazonas: A. Mathews 3158 (G—isotype).

PRIVA PORTORICENSIS Urb.

Bibliography: Urb., Symb. Ant. 4: 534. 1903; Prain, Ind. Kew. Suppl. 5: 207. 1921; Britton & P. Wils., Scient. Surv. Porto Rico 6: 144 & 145. 1925; Moldenke in Fedde, Repert. Spec. Nov. 41: 19—21. 1936; Moldenke, Résumé 58, 419, & 468. 1959.

PRIVA SOCOTRANA Moldenke

Additional bibliography: Hill & Salisb., Ind. Kew. Suppl. 10: 184. 1947; Moldenke, Phytologia 5: 111. 1954; Moldenke, Résumé 158 & 468. 1959.

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NOTES ON NEW AND NOTEWORTHY PLANTS. XLVII

Harold N. Moldenke

CALLICARPA BICOLOR var. BERMEJOSI Moldenke, var. nov.

Haec varietas a forma typica speciei recedit laminis foliorum oblongo-lanceolatis vel oblongis 13—18 cm. longis 3—5 cm. latis, ad basin apicemque longe-acuminatis, margine subintegris vel obscure sinuato-crenatis.

This variety differs from the typical form of the species in having its leaf-blades oblong-lanceolate or oblong, 13—18 cm. long, 3—5 cm. wide, conspicuously long-acuminate at both ends, and subentire or obscurely sinuate-crenate along the margins.

The type of the variety was collected by J. Bermejos — in

whose honor it is named — at Bulalacao, Mindoro, Philippine Islands, in August or September, 1906, and is number 1534 in the herbarium of the Philippine Bureau of Science, deposited in the United States National Herbarium at Washington.

CALLICARPA BICOLOR var. SUBINTEGRIFOLIA Moldenke, var. nov.

Haec varietas a forma typica speciei laminis foliorum margine integris vel subintegris recedit.

This variety differs from the typical form of the species in having the margins of its leaf-blades entire or subentire.

The type of the variety was collected by Jacinto Ramos at Pangil, in Laguna Province, Luzon, Philippine Islands, on May 27, 1959, and is number 39880 in the Philippine National Herbarium, deposited in the United States National Herbarium at Washington.

CALLICARPA FORMOSANA f. PARVIFOLIA Moldenke, f. nov.

Haec forma a forma typica speciei laminis foliorum uniforme 1—3 cm. longis 7—15 mm. latis recedit.

This form differs from the typical form of the species in having the mature leaf-blades (on fruiting plants) uniformly only 1—3 cm. long and 7—15 mm. wide.

The type of the form was collected by L. Escritor at Palanan Bay, in the province of Isabela, Luzon, Philippine Islands, in June, 1913, and is number 21155 in the herbarium of the Philippine Bureau of Science, deposited in the United States National Herbarium at Washington.

LANTANA RUGULOSA var. PARVIPEDUNCULATA Moldenke, var. nov.

Haec varietas a forma typica speciei pedunculis brevissimis recedit.

This variety differs from the typical form of the species in having its peduncles less than 1 cm. long.

The type of the variety was collected by Octavio Velarde Nuñez (no. 3005) at 2750 meters altitude in the province of Cajabamba, Cajamarca, Peru, on November 16, 1950, and is deposited in the United States National Herbarium at Washington.

SPHENODESME PIERREI var. THAILANDICA Moldenke, var. nov.

Haec varietas a forma typica speciei foliis subtus plusminus dense pubescentibus recedit.

This variety differs from the typical form of the species in having the lower leaf-surface more or less densely pubescent or pilosulous.

The type of the variety was collected by Kai Larsen (no. 8326) in scrub at Tha Ki Len, Thailand, on November 19, 1961, and is deposited in the H. N. Moldenke Herbarium at Plainfield, New Jersey. The collector notes that the plant is "very common in scrub all over the district."

SYNGONANTHUS FROESII Moldenke, sp. nov.

Herba annua caulescens; caulibus simplicibus erectis 7—9 cm.

longis foliosis; umbella primaria terminali; vaginis dense hirsutulis; pedunculis gracillimis 3—7 cm. longis sparse villosulis; capitulis hemisphaericis albis 4—5 mm. latis.

Annual herb; stems solitary, simple, erect, very slender, dark-brown, 7—9 cm. long, hirsutulous or eventually glabrescent toward the base, densely foliose except at the base; basal leaves rosulate, numerous, linear, erect or ascending, about 1 cm. long, less than 1 mm. wide, glabrous or very sparsely scattered-pilosulous, often twisted or partly curled in drying; stem leaves very numerous, imbricate, ascending-erect, linear-oblong, 7—9 mm. long, sharply acute at the apex, sessile and obtuse or rounded at the base, densely spreading-hirsutulous on both surfaces especially along the margins; inflorescence umbellate, the primary umbel terminal, often a diminutive secondary one with only 1 or 2 peduncles part way up the stem; sheaths cylindric, 5—18 mm. long, densely spreading-hirsutulous, obliquely split at the apex, the limb erect, appressed, to 3.5 mm. long; peduncles 30—40 in the terminal umbel, very slender, 3—7 cm. long, very sparsely villosulous, more densely so beneath the head, the hairs often gland-tipped just beneath the head; heads hemispheric, 4—5 mm. wide, white, many-flowered; involucral bractlets oblong, shiny, about 2 mm. long and 1 mm. wide, acuminate at the apex, glabrous.

The type of this distinctive species was collected by Ricardo de Lemos Fróes (no. 29904) — in whose honor it is named — in sandy soil in a wet area of the "campos gerais" at Conceoção do Araguáia, Pará, Brazil, on June 25, 1953, and is deposited in the H. N. Moldenke Herbarium at Plainfield, New Jersey.

TEIJSMANNIODENDRON BOGORIENSE var. PENTAPHYLLUM Moldenke, var. nov.

Haec varietas a forma typica speciei foliolis 5 recedit.

This variety differs from the typical form of the species in having the leaves 5-foliolate.

The type of the variety was collected by A. Cuadra [North Borneo Forestry Department A.877] on rolling land, Compt 13, at Kabili-Sepilok Forest Reserve, Elopura Forest District, Sandakan, British North Borneo, on August 5, 1948, and is deposited in the United States National Herbarium at Washington. The collector describes the plant as a tree, 30 feet tall, 3 feet 6 inches in trunk diameter, with pale-violet flowers, called "medang partes" in Malay. The wood is used for sawed timbers.

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ADDITIONAL NOTES ON THE GENUS LIPPIA. II

Harold N. Moldenke

LIPPIA Houst.

Additional & emended bibliography: N. J. Anderss., Vet. Akad.

Handl. Stockh. 1853: 198—199. 1854; N. J. Anderss., Galap. Veg. 80. 1859; Bocq., Adansonia 2: 89, 107, 109, 112, 114, 117, 121, 124, 125, 127, 131—133, 143, 147, 149, 152—155, 158, & 159 (1862), 2: 296 (1863), and 3: 178, 180, 184, 243—246, & 248, pl. 17. 1863; Bocq., Rev. Verbenac. 89, 107, 109, 112, 114, 117, 121, 124, 127, 128, 131—133, 143, 147, 149, 152—155, 158, 159, 178, 180, 184, 243, 246, & 248, pl. 17. 1863; Lefroy, Bull. U. S. Nat. Mus. 25: 96. 1884; Rose, Contrib. U. S. Nat. Herb. 1: 137. 1892; A. S. Hitchc., Ann. Rep. Mo. Bot. Gard. 4: 117. 1893; Robinson & Greenm., Am. Journ. Sci. 150 [ser. 3, 50]: 147 & 162. 1895; B. L. Robinson, Proc. Am. Acad. 38: 196. 1902; Kawakami, List Pl. Formos. 85. 1910; W. Stone, Ann. Rep. N. J. State Mus. 1910: 661, 818, & 820. 1911; C. K. Schneid., Illust. Handb. Laubholzk. 591 & 593, fig. 385a. 1911; A. Stewart, Proc. Calif. Acad. Sci., ser. 4, 1: 133—134. 1911; Poběguin, Pl. Méd. Guin. 45. 1912; J. H. Holland, Kew Bull. Addit. Ser. 9 [Useful Pl. Nigeria 3]: 517—518. 1915; Gamble, Fl. Madras 1085 & 1088—1089. 1924; L. H. Bailey, Man. Cult. Pl., ed. 1, pr. 1, 628, 630, 825, & 842 (1924) and pr. 2, 628, 630, 825, & 842. 1925; S. Sasaki, List Pl. Formos. 352. 1928; F. R. Irvine, Pl. Gold Coast lxix, lxx, lxxix, & 263—264. 1930; Tu, Chinese Bot. Dict., abridg. ed., 450. 1933; Sampaio, Bol. Mus. Nac. Rio Jan. 13: 239 & 280. 1937; Dalz., Useful Pl. W. Trop. Afr. 455—456. 1937; Fletcher, Kew Bull. Misc. Inf. 1938: 408 & 410. 1938; Rabate, Journ. Pharm. & Chim. 28: 437—442. 1938; L. H. Bailey, Man. Cult. Pl., ed. 1, pr. 3, 628, 630, 825, & 842. 1938; Rabate, Rev. Bot. Appl. 18 (201): 250—254. 1938; Palfray, Sabetay, & Pétit, Chimie & Indust. 43: 367—370. 1940; Laffitte & Rabate, Chimie & Indust. 43: 365—366. 1940; L. H. Bailey, Man. Cult. Pl., ed. 1, pr. 4, 628, 630, 825, & 842. 1944; LeCointe, Amaz. Bras. III Arv. & Pl. Uteis, ed. 2, [Brasiliana, ser. 5, 251:] 180, 318, & 501. 1947; Blakelock, Kew Bull. Misc. Inf. 1949: 539. 1949; L. H. Bailey, Man. Cult. Pl., ed. 2, 841, 842, & 1078. 1949; Chittenden, Roy. Hort. Soc. Dict. Gard. 3: 1126 & 1188—1189 (1951) and 4: 1898. 1951; Asprey & Robbins, Ecol. Monog. 23: 372 & 411. 1953; Darlington & Wylie, Chromosome Atl., pr. 1, 323 & 511. 1955; Moldenke, Phytologia 5: 24, 26, 95—99, 226, & 510. 1957; E. W. Lathrop, Univ. Kans. Sci. Bull. 39: 136 & 172. 1958; J. Hutchinson, Fam. Flow. Pl., ed. 2, 2: 395. 1959; Sebastine, Bull. Bot. Surv. Ind. 1: 95. 1959; Anon., Kew Bull. Gen. Index 1929-1965, 172. 1959; Nath, Bot. Surv. South. Shan States 144. 1960; Runner, Rep. G. W. Groff Coll. 361. 1961; F. R. Irvine, Woody Pl. Ghana 758—759. 1961; Darlington & Wylie, Chromosome Atl., pr. 2, 323 & 511. 1961; A. E. Brooks, Austral. Nat. Pl. Home Gard. 95. 1961; Comins, Bot. Surv. S. Afr. Mem. 33: 12. 1962; Quezel & Santa, Nouv. Fl. Algérie 2: 779 & 790. 1963; Thieret, Castanea 28: 170. 1963; Santapau & Wagh, Bull. Bot. Surv. India 5: 107. 1963; Ramamurthy, Bull. Bot. Surv. India 5: 264. 1963; Rao, Aggarwal, & Mukherjee, Bull. Bot. Surv. India 5: 315. 1963; Huber, Hepper, & Meikle in Hutchinson & Dalz., Fl. W. Trop. Afr., ed. 2, 2: 432. 1963; Meikle in Hutchinson & Dalz., Fl. W. Trop. Afr., ed. 2, 2: 437. 1963; E. E. Lord, Shrubs & Trees Aus-

tral. Gard., rev. ed., 245. 1964; T. A. Rao, Bull. Bot. Surv. India 6: 54. 1964; Rao & Sastry, Bull. Bot. Surv. India 6: 281. 1964; Singh & Mitra, Bull. Bot. Surv. India 6: 140. 1964; Marg. Nielsen, Introd. Flow. Pl. W. Afr. 163 & 164, fig. 43e. 1965; Ungar, Univ. Kans. Sci. Bull. 46: 18, 26, 46, 48, 59, 61, & 63. 1965; Liogier, Rhodora 67: 349. 1965; J. E. Moore, Castanea 30: 26. 1965; Moldenke, Biol. Abstr. 46: 8464 (1965), 47: 3296 (1966), and 47 (16): S.89 & S.161. 1966; Anon., Gen. Costa Ric. Phan. 10. 1966; G. B. Foster, Herbs for Every Gard. 199. 1966; A. María, Pl. Valle Cochabamb. 2: 41 & 42. 1966; Reese & Thieret, Castanea 31: 274. 1966; Jiménez, Supl. Cat. Fl. Doming. 1: 217. 1966; Gaiser & Moore, Surv. Vasc. Pl. Lambton Co. 101. 1966; Fournier, Imp. Tree Fam. Costa Ric. 13. 1966; Moldenke, Résumé Suppl. 14: 1, 2, & 9. 1966; Anon., Assoc. Etud. Tax. Fl. Afr. Trop. Index 1965: 67. 1966; J. Gómez, Biota 6: 101, 102, & 119. 1966; Rickett, Wild Fls. U. S. 1 (2): 364, pl. 113. 1966; Anon., Biol. Abstr. 47 (20): S.89 & S.162. 1966; Moldenke, Phytologia 13: 343—368, 401, 445—446, & 510 (1966) and 14: 217, 325—326, & 344. 1967; Shinn, Univ. Kans. Sci. Bull. 46: 790, 804, & 928. 1967.

An unnamed editor of Biological Abstracts places the genus Lippia in the Phytolaccaceae in Biol. Abstr. 46: 8464 (1965) for no explained reason! Chittenden (1951) states that the genus contains "about 90 species, mostly shrubs". Shinn (1967) records the bee, Calliopsis hondurasica, gathering pollen from members of this genus, as well as from "Phyla strigosa" and Verbena.

Nielsen (1965) points out that in Lippia and in Lantana the ovary is usually composed of only one carpel and the cross-wall making the fruit apparently 2-celled should not be mistaken for the common wall of two joined carpels; such a wall would be at right angles to the wall actually existing.

To be added to the list of excluded species:

Lippia baillonia Darlington & Wylie = Diostea juncea (Gill. & Hook.) Miers

Lippia canescens L. = Mentha alopecuroides Hull, Lamiaceae

Lippia dubia Trev. = Phyla scaberrima (A. L. Juss.) Moldenke

LIPPIA ABYSSINICA (Otto & Dietr.) Cuf.

Additional & emended bibliography: Bocq., Adansonia 3: [Rev. Verbenac.] 244. 1863; Poběguin, Pl. Méd. Guin. 45. 1912; J. H. Holland, Kew Bull. Addit. Ser. 9 [Useful Pl. Nigeria 3]: 517—518. 1915; F. R. Irvine, Pl. Gold Coast lxix, lxx, & 263—264. 1930; Dalz., Useful Pl. W. Trop. Afr. 455—456. 1937; Rabate, Journ. Pharm. & Chim. 28: 437—442. 1938; Rabate, Rev. Bot. Appl. 18 (201): 250—254. 1938; Palfray, Sabetay, & Pétit, Chimie & Indust. 43: 367—370. 1940; Laffitte & Rabate, Chimie & Indust. 43: 365—366. 1940; Moldenke, Phytologia 13: 344 & 354. 1966; Anon., Assoc. Etud. Tax. Fl. Afr. Trop. Index 1965: 67. 1966.

Dalziel (1937) says "The dried leaves are odorous and are infused like tea, which is appreciated by Europeans as well as the people, and called bush tea. This is widely used as a sudorific febrifuge, and laxative for colic, etc., in much the same way as

Ocimum; a common children's remedy for fever and constipation, accompanied by a light purge, useful also for common colds and chest complaints. The leaves are sometimes mixed with those of Sesamum or cooked along with other food to produce the same effects. They are also a common ingredient in prescriptions for venereal disease. In Gold Coast the leaves boiled with palm-nuts are given to women in partuition to assist delivery of the afterbirth (Irvine). In French Guinea the decoction of the leaves is also used as a fumigation and bath, and as a hot application locally applied for ear troubles (Poběguin.....). In Gambia beehives are fumed with smoke from this herb to attract bees (Dawe)! He records many vernacular names: "afurati", "bahé-bahé", "bahé", "diohuli", "efinrin-gogara", "fasau", "fetfetti", "borom-borom", "Gambian tea bush", "gane ba", "guilel guéri", "kani ba", "kingkilli ba", "kimbo", "mbalhat", "mbormbor", "ngāsu", "ngāsuru", "nyŏna", "saa-munum" [=the Ocimum viride of the dry open plains], and "sisiling hyamo".

LIPPIA ABYSSINICA var. PUBESCENS (Moldenke) Moldenke

Additional bibliography: Moldenke, Phytologia 13: 344. 1966; Anon., Assoc. Etud. Tax. Fl. Afr. Trop. Index 1965: 67. 1966.

LIPPIA ALBA (Mill.) N. E. Br.

Additional synonymy: Lippia gemina H.B.K. apud Sampaio, Bol. Mus. Nac. Rio Jan. 13: 239, sphalm. 1937.

Additional & emended bibliography: N. J. Anderss., Halap. Veg. 81. 1859; Bocq., Adansonia 3: [Rev. Verbenac.] 244. 1863; Gamble, Fl. Madras 1088—1089. 1924; Sampaio, Bol. Mus. Nac. Rio Jan. 13: 239 & 280. 1937; Le Cointe, Amaz. Bras. III Arv. & Pl. Uteis, ed. 2, [Brasiliana, ser. 5, 251:] 180 & 318. 1947; Sebastine, Bull. Bot. Surv. India 1: 95. 1959; Santapau & Wagh, Bull. Bot. Surv. India 5: 107. 1963; Singh & Mitra, Bull. Bot. Surv. India 6: 140. 1964; Moldenke, Phytologia 13: 345—346. 1966; Moldenke, Résumé Suppl. 14: 2. 1966.

The flowers on Sagástegui 6035 are described as "white", but those on Sagástegui & Aldave 5755 were "violet" and those on Woolston 818 were "purple-pink". L. S. Smith describes the plant as a "shrub with low spreading branches at times almost decumbent, the flowers opening pale-violet with a large white central area, but yellowish in the throat, later becoming more or less pale-violet throughout." His Arg.2 was taken from cultivated material originally from Entre Ríos, Argentina.

The H. C. Hanson s.n. [Boguillas, August 3, 1919], distributed as this species, is actually L. graveolens H.B.K., while G. F. Gaumer 830 is Lantana microcephala A. Rich. Sebastine (1959) cites his nos. 817 & 1206 from India.

Additional citations: COSTA RICA: Guanacaste: A. R. Moldenke 1324 (Rf). CUBA: Las Villas: Ekman 16988 (Mi). WINDWARD ISLANDS: Grenada: Webster, Ellis, & Miller 9485 (S). Martinique: Kimber 587 (Ws). PERU: Amazonas: Sagástegui 6035 (Ac). Loreto: Sagás-

tegui & Aldave 5755 (Ac). BRAZIL: Pernambuco: L. S. Smith Bras. 44 (Ac). BOLIVIA: El Beni: H. H. Rusby 916 (Ws). PARAGUAY: L. S. Smith Parag.1 (Rf). ARGENTINA: Entre Ríos: L. S. Smith Arg.32 (Ac). Santa Fé: L. S. Smith Arg.29 (Ac). CULTIVATED: Argentina: L. S. Smith Arg.2 (Ac), Arg.13 (Rf). Paraguay: Woolston 818 (S).

LIPPIA AMERICANA L.

Additional & emended bibliography: Bocq., Adansonia 3: [Rev. Verbenac.] 244. 1863; Moldenke, Phytologia 13: 346--347. 1966.

The flowers on López & Sagástegui 5225 are described as "white".

Additional citations: COLOMBIA: Magdalena: H. H. Smith 450 (Ws). PERU: Cajamarca: López & Sagástegui 5225 (Ac).

LIPPIA AMERICANA f. PILOSA Moldenke

Additional bibliography: Moldenke, Phytologia 12: 79 & 81--82. 1965.

LIPPIA ANGUSTIFOLIA Cham.

Additional bibliography: Moldenke, Phytologia 13: 347 & 362. 1966.

LIPPIA BALANSAE Briq.

Additional bibliography: Moldenke, Phytologia 13: 348. 1966.

Additional citations: PARAGUAY: L. S. Smith Parag.13 (Rf), Parag.17 (Ac).

LIPPIA BOLIVIANA Rusby

Additional bibliography: Moldenke, Phytologia 13: 348. 1966.

Additional citations: BOLIVIA: Cochabamba: M. Bang 979 (Ws--isotype).

LIPPIA BOLIVIANA var. ANGUSTA Moldenke

Bibliography: Moldenke, Phytologia 14: 325--326. 1967.

Steinbach describes this plant as a shrub, with fragrant leaves and white fragrant flowers, blooming in May, growing in dry rocky soil at 2575 meters altitude.

Citations: BOLIVIA: Cochabamba: R. F. Steinbach 191 (S--type, Z--isotype).

LIPPIA BRACTEOSA (Mart. & Gal.) Moldenke

Additional bibliography: Moldenke, Phytologia 13: 349. 1966.

Additional citations: MEXICO: Chiapas: Laughlin 659 (Ac).

LIPPIA CALLICARPAEFOLIA H.B.K.

Additional & emended bibliography: Bocq., Adansonia 3: [Rev. Verbenac.] 244. 1863; Moldenke, Phytologia 13: 349. 1966.

McVaugh describes this plant as a coarse shrub, 3 m. tall, the bracts purple, the corollas pinkish-white, then turning yellow and finally nearly orange, found "occasional" on steep mountainsides in pine-oak forest on thin soil over limestone. The Lang-

lassé 584, cited below, is from "Cerro Verde" and may therefore have been collected either in Guerrero or Michoacán. The collector records the vernacular name "salvia" and notes "Aromatique. Fleurs rouge vif, pointellées de jaune. Epi rouge-cremoisi."

Additional citations: MEXICO: Michoacán: Langlassé 584 (Mi); R. McVaugh 22697 (Mi).

LIPPIA CARDIOSTEGIA Benth.

Additional bibliography: Moldenke, Phytologia 13: 350. 1966.

The flowers on Breedlove 14946 are described as "pale-yellow"; it was collected on a steep rocky slope with Quercus.

Additional citations: MEXICO: Chiapas: Breedlove 14946 (Ac).

LIPPIA CARVIODORA Meikle

Additional bibliography: Anon., Kew Bull. Gen. Index 1929-1956, 172. 1959; Moldenke, Phytologia 13: 350. 1966.

LIPPIA CHEVALIERII Moldenke

Additional bibliography: J. G. Baker in Thiselt.-Dyer, Fl. Trop. Afr. 5: 280. 1900; Hutchinson & Dalz., Fl. W. Trop. Afr., ed. 1, 2 (1): 270. 1931; Meikle in Hutchinson & Dalz., Fl. W. Trop. Afr., ed. 2, 2: 437. 1963; Moldenke, Phytologia 13: 350. 1966.

Meikle (1963) says that the L. adoensis of Fl. Trop. Afr. (1900) and of Fl. West Trop. Afr., ed. 1 (1931) is in part this species. He describes the plant as an erect aromatic subshrub to about 3 feet tall, the floral bractlets covered with whitish or silvery-gray tomentum often becoming bright-yellow in drying, the flowers minute, whitish with a yellow throat, blooming in February and October to December, fruiting in December. He cites the following specimens: SENEGAL: Heudelot 103, Monod 8681, Thierry 227. GAMBIA: Brown-Lester 4 & 28, Dawe 30, Fox 48, Ingram s.n., Saunders 108. MALI: Chevalier 67. PORTUGUESE GUINEA: Esp. Santo 2341 & 3552. GUINEA: Caille s.n. [Herb. Chevalier 14772], Herb. Mission Pharm. A. O. F. 3/1934, Schnell 7411. SIERRA LEONE: Scott Elliot 4285. NORTHERN NIGERIA: Keay FHI.28012, Meikle 289, Onwudinjoh FHI. 24037.

LIPPIA CHIAPASENSIS Loes.

Additional bibliography: Moldenke, Phytologia 13: 350—351. 1966.

Breedlove describes this plant as a shrub, 6 feet tall, growing on a steep rocky slope at 7300 feet altitude, fruiting in April.

Additional citations: MEXICO: Chiapas: Breedlove 9485 (Mi, Ws).

LIPPIA CHRYSANTHA Greenm.

Additional bibliography: Moldenke, Phytologia 13: 351 & 365. 1966.

Additional citations: MEXICO: Morelos: L. S. Smith Mex.10 (Z).

LIPPIA CONTROVERSA Moldenke

Additional bibliography: Moldenke, Phytologia 13: 351. 1966; Mol-

denke, Résumé Suppl. 14: 1. 1966.

Recent collectors describe this plant as a shrub, 3--8 feet tall, with yellow flowers (Koelz 34190), flowering and fruiting in December, and growing on dry forested slopes.

Additional citations: MEXICO: Colima: Koelz 34190 (Mi). Jalisco: Koelz 34170 (Mi).

LIPPIA CULAENICOLA Moldenke

Bibliography: Moldenke, Phytologia 13: 445. 1966; Moldenke, Résumé Suppl. 14: 1. 1966.

Citations: MEXICO: Jalisco: R. McVaugh 23036 (Mi--type, Z--isotype, Z--photo of type).

LIPPIA DOMINGENSIS Moldenke

Additional bibliography: Moldenke, Phytologia 12: 146. 1965; Jiménez, Supl. Cat. Fl. Doming. 1: 217. 1966.

LIPPIA FERRUGINEA H.B.K.

Additional & emended bibliography: Bocq., Adansonia 3: [Rev. Verbenac.] 244. 1863; Moldenke, Phytologia 13: 353. 1966.

LIPPIA FORMOSA T. S. Brandeg.

Additional bibliography: Moldenke, Phytologia 13: 353. 1966.

Wiggins found this plant growing on the banks of a small arroyo and describes the bracts as papery, pink to nearly white, and [on his no. 14536] the "corolla-tube yellow in anthesis, turning lavender in age, lobes lavender."

Additional citations: MEXICO: Baja California: I. L. Wiggins 14536 (Du--438444).

LIPPIA GARDNERIANA Schau.

Additional bibliography: Moldenke, Phytologia 13: 353 & 359. 1966.

LIPPIA GEHRTII Moldenke

Additional bibliography: Moldenke, Phytologia 13: 354. 1966.

L. S. Smith describes this plant as a subshrub with spreading branches, 30--60 cm. tall, the leaves in whorls of 3's or 4's, the flowers opening pale-violet on the lobes, with a white-ringed yellowish area in the center, later changing to more or less pale-violet with a darker area in the center, growing in cerrado on pale sandy soil, flowering in February.

Additional citations: BRAZIL: São Paulo: L. S. Smith Bras.74 (Z).

LIPPIA GLANDULOSA Schau.

Additional bibliography: Moldenke, Phytologia 13: 354. 1966; Moldenke, Résumé Suppl. 14: 2. 1966.

LIPPIA GRANDIFOLIA Hochst.

Additional bibliography: Marg. Nielsen, Introd. Flow. Pl. W.

Afr. 164. 1965; Moldenke, Phytologia 13: 354. 1966.

Nielsen (1965) states that this species is "more common elsewhere" than in western Africa.

LIPPIA GRAVEOLENS H.B.K.

Additional & emended bibliography: Bocq., Adansonia 3: [Rev. Verbenac.] 244. 1863; Moldenke, Phytologia 13: 354—355. 1966; Moldenke, Résumé Suppl. 14: 1 & 9. 1966.

The flowers on Kruckeberg 4807 are described as "pale lemon-yellow", while on S. S. White 1938 they were "white". Kruckeberg reports finding the species in scrub with Cordia and mesquite on limestone slopes.

Additional citations: TEXAS: Brewster Co.: H. C. Hanson s.n. [Boguillas, August 3, 1919] (Ws). Cameron Co.: J. R. Crutchfield 1108 (Ld). MEXICO: Coahuila: S. S. White 1938 (Mi). Nuevo León: G. L. Fisher s.n. [July 14, 1924] (Ws); Kruckeberg 4807 (Du—506122). Vera Cruz: L. S. Smith Mex.36 (Ac). Yucatán: G. F. Gaumer 832 [Field Mus. 15474] (Ws).

LIPPIA HEDERAEFOLIA Mart. & Schau.

Additional & emended bibliography: Bocq., Adansonia 3: [Rev. Verbenac.] 244. 1863; Moldenke, Phytologia 13: 355—356. 1966.

LIPPIA HIRSUTA L. f.

Additional bibliography: Moldenke, Phytologia 13: 356. 1966.

The Herb. F. J. Young s.n., distributed as this species, is actually Lantana achyranthifolia Desf.

LIPPIA HIRTA (Cham.) Meisn.

Additional bibliography: Moldenke, Phytologia 13: 356. 1966.

L. S. Smith describes this plant as an erect subshrub, 0.6—1 meter tall, the corollas more or less pale-violet, with a white-ringed yellowish eye.

Additional citations: BRAZIL: Paraná: L. S. Smith Bras.61 (Ac).

LIPPIA HYPOLEIA Briq.

Additional bibliography: Moldenke, Résumé Suppl. 14: 1 & 2. 1966; Moldenke, Phytologia 13: 356—357 & 362 (1966) and 14: 217. 1967.

Recent collectors describe this plant as a shrub, 2 m. tall, with a pungent odor, the corollas white or white with a yellow center, blooming in October. In San Luis Potosí it has been found growing in thorn-scrub—Quercus woods with tree legumes, Crataegus, Rhus, bromeliads, many mosses and ferns on north-facing hillsides with nearby streams, and in dense moist Quercus forests with palmetto, Cycas, and many shrub composites in the understory, in the tropical evergreen vegetation belt. Janzen found it growing in black soil with limestone outcrops on the coastal plain in an area of secondary regeneration, at an altitude of only 45 feet. The corollas are described as "white" on

Roe & Roe 2218 & 2304 and as "white with yellow center" on Roe & Roe 2330.

Additional citations: MEXICO: Hidalgo: Weber & Charette 11939 (Du—498875). Oaxaca: Janzen s.n. [13 January 1964] (Mi). San Luis Potosí: Roe & Roe 2218 (Z), 2304 (Rf), 2330 (Ac). Vera Cruz: C. L. Smith 1076 (Ws).

LIPPIA HYPOLEIA var. OVATIFOLIA Moldenke

Bibliography: Moldenke, Phytologia 14: 217. 1967.

This variety differs from the typical form of the species in having its leaf-blades distinctly and uniformly ovate.

The type of the variety was collected by Keith Roe, Eunice Roe, and Scott Mori (no. 1121) in scrubby Quercus woodlands on a rocky hillside with Acacia and Agave, on highway 195 south of Bochil, 33 km. [by road] north of the junction of highways 190 and 195, at an altitude of about 1500 m., in the highlands of Chiapas, Mexico, on August 10, 1965, and is deposited in my personal herbarium at Plainfield, New Jersey. The collectors describe the plant as a shrub, 1.5 m. tall, with white and yellow flowers.

Citations: MEXICO: Chiapas: Roe, Roe, & Mori 1121 (Z—type).

LIPPIA INOPINATA Moldenke

Additional bibliography: Moldenke, Phytologia 13: 349 & 357. 1966; Moldenke, Résumé Suppl. 14: 1. 1966.

LIPPIA INTEGRIFOLIA (Griseb.) Hieron.

Additional bibliography: Moldenke, Phytologia 13: 357. 1966.

Additional citations: ARGENTINA: Catamarca: Schreiter s.n. [Herb. Inst. Miguel Lillo 32855] (Du—317598).

LIPPIA JAVANICA (Burm. f.) Spreng.

Additional bibliography: Comins, Bot. Surv. S. Afr. Mem. 33: 12. 1962; Moldenke, Phytologia 13: 358. 1966.

Comins (1962) reports that this species grows in the xeric scrub in the Cape Province of South Africa. Milne-Redhead & Taylor describe it as an aromatic bushy herb or dwarf shrub, to 12 dm. tall, the stems woody below, the bark brown, with light-brown streaks, the young shoots pale-green, tinged reddish-purple, very obscurely 4-sided, the leaves dull-green above, gray-green beneath, the veins and reticulation of the veinlets sunken above and raised beneath, the bracts yellow-green, "hiding under the calyx", the corolla white, and the anthers sulphur-yellow, inhabiting termitaria in open areas of cultivated ground on sand in what was once Brachystegia-Uapaca woodland, at 900 m. altitude, blooming in May. De Winter found it in red sandy loam of open bushveld, and calls it a large shrub, to 5 feet tall, often growing in the shade of trees, flowering in February, and notes that his material was "collected for chemical analysis for C. S. I. R. (Dr. Enslin)".

The Milne-Redhead & Taylor 11049, distributed as L. javanica,

appears to me to be more likely L. ukambensis Vatke.

Additional citations: TANGANYIKA: Milne-Redhead & Taylor 10147 (S). SOUTH AFRICA: Transvaal: De Winter 7555 (S).

LIPPIA JUNELLIANA (Moldenke) Troncoso

Additional bibliography: Moldenke, Phytologia 13: 358--359. 1966.

L. S. Smith describes this plant as a subshrub, about 60 cm. tall, the corollas opening more or less light-lilac with a white eye and some pale-yellow in the throat, later becoming light-lilac to light-violet with a slightly darker center, and found it growing on the top of a stony rise near a road cutting.

Additional citations: ARGENTINA: Córdoba: Stuckert 3909 (N). La Rioja: Stuckert 17145 (N). Santiago del Estero: Burkart 20347 (N).

LIPPIA LASIOCALYCINA Cham.

Additional bibliography: Moldenke, Biol. Abstr. 46: 8464. 1965; Moldenke, Phytologia 13: 359. 1966.

LIPPIA LASIOCALYCINA var. SAINTHILAIREI Moldenke

Additional bibliography: Moldenke, Biol. Abstr. 46: 8464. 1965; Moldenke, Phytologia 13: 359. 1966.

LIPPIA LINEARIS H.B.K.

Additional & emended bibliography: Bocq., Adansonia 3: [Rev. Verbenac.] 244. 1863; Moldenke, Phytologia 12: 256—257. 1965.

LIPPIA LORENTZII Moldenke

Additional bibliography: Moldenke, Phytologia 12: 260—262. 1965.

Woolston describes this plant as a sprawling or erect shrub, 30—80 cm. tall, with purple flowers in June, growing on lake shores.

Additional citations: PARAGUAY: Woolston 1263 (S).

LIPPIA LUPULINA Cham.

Additional & emended bibliography: Bocq., Adansonia 3: [Rev. Verbenac.] 244. 1863; Moldenke, Phytologia 13: 359 & 360. 1966.

Additional citations: BRAZIL: Paraná: L. S. Smith Bras.60 (Ac).

LIPPIA MICHOACANA Moldenke

Bibliography: Moldenke, Phytologia 13: 445--446. 1966; Moldenke, Résumé Suppl. 14: 2. 1966.

Citations: MEXICO: Michoacán: R. McVaugh 22869 (Mi—type, Z—isotype, Z—photo of type).

LIPPIA MICROCEPHALA Cham.

Additional & emended bibliography: Bocq., Adansonia 3: [Rev. Verbenac.] 244. 1863; Moldenke, Phytologia 13: 361. 1966; Moldenke, Résumé Suppl. 14: 2. 1966.

LIPPIA MICROMERA Schau.

Additional bibliography: Lefroy, Bull. U. S. Nat. Mus. 25: 96. 1884; Liogier, Rhodora 67: 349. 1965; Moldenke, Phytologia 13: 361. 1966.

Additional citations: CULTIVATED: Trinidad: L. S. Smith Tr.8 (Z).

LIPPIA MICROMERA var. HELLERI (Britton) Moldenke

Additional bibliography: Liogier, Rhodora 67: 349. 1965; Jiménez, Supl. Cat. Fl. Doming. 1: 217. 1966; Moldenke, Phytologia 13: 361. 1966.

Jiménez (1966) cites his no. 1025 from the Dominican Republic.

LIPPIA MICROPHYLLA Cham.

Additional & emended bibliography: Bocq., Adansonia 3: [Rev. Verbenac.] 244. 1863; Moldenke, Phytologia 13: 361. 1966.

LIPPIA MODESTA Briq.

Additional bibliography: Moldenke, Phytologia 13: 361. 1966.

Recent collectors describe this plant as a decumbent herb, 5--10 cm. tall, growing on low, dry, sandy, sunny campos, at altitudes of 60--80 m., flowering in December. The flowers are described as "yellow" on R. E. Fries 616 and as "yellow and orange" on Woolston 413. The Fries collection cited below was previously incorrectly cited by me as L. trachyphylla Briq., while the Herter collection was cited as L. asperrima var. longipedunculata Moldenke.

Additional citations: PARAGUAY: Woolston 413 (S, Z). URUGUAY: Herter 2033a [Herb. Herter 50765] (S). ARGENTINA: Salta: R. E. Fries 616 (S).

LIPPIA MORONGII Kuntze

Additional bibliography: Moldenke, Phytologia 13: 362. 1966.

Additional citations: URUGUAY: Herter 989 [Herb. Herter 82594] (Ws).

LIPPIA MULTIFLORA Moldenke

Additional bibliography: J. G. Baker in Thiselt.-Dyer, Fl. Trop. Afr. 5: 280. 1900; F. R. Irvine, Fl. Gold Coast lxix, lxx, & 263--264. 1930; Hutchinson & Dalz., Fl. W. Trop. Afr., ed. 1, 2 (1): 270. 1931; Rabate, Journ. Pharm. & Chim. 28: 437--442. 1938; Rabate, Rev. Bot. Appl. 18 (201): 250--254. 1938; Palfray, Sabetay, & Pétit, Chimie & Indust. 43: 367--370. 1940; Laffitte & Rabate, Chimie & Indust. 43: 365--366. 1940; F. R. Irvine, Woody Pl. Ghana 758--759. 1961; Meikle in Hutchinson & Dalz., Fl. W. Trop. Afr., ed. 2, 2: 436 & 437, fig. 306. 1963; Marg. Nielsen, Introd. Flow. Pl. W. Afr. 163 & 164, fig. 43e. 1965; Moldenke, Phytologia 13: 362. 1966.

Illustrations: Meikle in Hutchinson & Dalz., Fl. W. Trop. Afr., ed. 2, 2: fig. 306. 1963; Marg. Nielsen, Introd. Flow. Pl. W. Afr. fig. 43e. 1965.

Meikle (1963) says that the L. adoensis of the Fl. Trop. Afr. (1900) and of the Fl. W. Trop. Afr., ed. 1 (1931) is L. multiflora, in part. He calls the plant a robust woody perennial, up to 12 feet tall, with large oblong-lanceolate bluish-green leaves, pleasantly aromatic flowers which are small and whitish, borne in branched inflorescences, growing in savannas. He cites: GUINEA: Herb. Mission Pharm. A. O. F. 2, Martine 188. SIERRA LEONE: Deighton 4089, Jaeger 3944, King 190b, Scott Elliot 4262 & 4878, Smythe 121. IVORY COAST: Leeuwenberg 2066. GHANA: Irvine 1743, Johnson 542, Morton GC. 9551 & 9911, Vigne FH.1813 & 3881. DAHOMEY: Poisson s.n. NORTHERN NIGERIA: Barter 768, Keay FHI.21040, Meikle 722 & 1231, Noble 40. SOUTHERN NIGERIA: Foster 133, Keay FHI.23433, Keay & Jones FHI.14810, Latilo FHI.27331, Millen 143. "Also in Rio Muni, Gabon, Congo, Sudan and Ubangi-Shari". It has been collected in anthesis in November and December and in fruit in January, June, and August.

Irvine (1961) gives L. adoensis Hochst. as a complete synonym of this taxon, but this is incorrect, as Meikle has pointed out. Irvine describes the plant as "A shortly pubescent shrub up to 7 feet high, stems ridged; leaves 6 x 2 in., broadly lanceolate to oblanceolate, subacute, toothed (serrulate) hairy below, tertiary nerves prominent; flowers (Jan.—Feb., June) white or lilac with yellow centres, fragrant, in ovoid, stalked, cone-like heads, in terminal panicle, nearly 1/2 in. long; fruit (Jan.). Local beehives are smoked with this fragrant plant before being placed in trees, to attract settling of bees (M. T. Dawe, Gambia and Fr. Equat. Afr.). It is a scent plant. Root-ashes are occasionally used as kitchen salt in Upper Ubangi (Chevalier). The leaves are used in tea-like infusions for feverishness, a decoction of the whole plant being used for pernicious attacks and the treatment completed by violent rubbing with fresh leaves. A root and leaf decoction is drunk on the Iv. Coast for gastro-intestinal troubles and enteritis (Kerharo and Bouquet). A leaf infusion is used by the Krobos for stomach ache (A. S. Thomas, Her. Kew). In Nigeria they are used for constipation as a febrifuge. In Ghana an infusion of sun-dried leaves is drunk like tea with sugar for stomach pains, and is also a laxative and much appreciated by children (Twi Dict.). A sudorific infusion is prepared in Fr. Equat. Africa from the leaves, which are also used for stomach troubles, as a substitute for Combretum micranthum and as a vapour bath for fever (Abbé Walker). The leaf infusion, drunk like strong tea, is used for coughs and colds and as a sudorific, being laxative and a febrifuge. It is also used for piles. A slightly bitter infusion prepared from the tender stalks and young leaves (half cigarette-tinful twice daily) is used in Nigeria for indigestion (Ainslie). The tea-like leaf infusion is widely known as a sudorific febrifuge, laxative for colic, &c., and is used in much the same way as Ocimum. It is a common children's remedy for fever and constipation, accompanied by a light purge and is used for common colds and chest complaints, the leaves being sometimes

mixed with those of Sesamum or cooked with other food to produce the same effects (Dalziel). A leaf decoction is used in Guinea as a fumigation and bath and as a hot application locally applied for ear troubles (Pobéguin, Fl. Méd. Guin., p. 45). The leaves are a common ingredient in remedies for venereal disease. The leaves, boiled with palm-nuts, are used by women to assist in the delivery of the after-birth. Like many other oil-yielding plants it is used for rhino-pharyngal (i.e. at the back of the throat), mouth, and eye-trouble, especially conjunctivitis, the leaf-juice being applied in eye-drops or nasal drops as required. It forms part of various complex treatments for sleeping sickness, especially for severe jaundice ('yellow fever') (Kerharo and Vouquet). The medicinal properties of this plant are mainly due to the presence of an oil of mint and camphor which yields levogyric camphor".

Irvine records the vernacular names "afuÐɔti" [meaning "gonorrhoea-urine-tree"], "Gambian tea bush", "neanosu", "saa-nunum", "tea bush", "ɔâsuru", "ɔaasuruu", and "ɔasu". He cites Eady s.n., Irvine 43, Johnson 542a & 584, Kitson s.n., Moor 208 & 2174, and Vigne 1813 & 3889. He gives the distribution of the species as "Waste ground; common on old farms (Savannah Forest); 'the bush of the Savannah'...Senegal to Cameroons and S. Africa." Nielsen (1965) states that it is "fairly common throughout West Africa" among the savanna undershrubs and is called "Gambia bush tea".

LIPPIA NIGERIENSIS Moldenke

Additional bibliography: Meikle in Hutchinson & Dalz., Fl. W. Trop. Afr., ed. 2, 2: 437. 1963; Moldenke, Phytologia 13: 362--363. 1966.

Meikle (1963) reduces this species to synonymy under L. rugosa A. Chev.

LIPPIA OAXACANA Robinson & Greenm.

Additional bibliography: Moldenke, Phytologia 13: 363. 1966.

Additional citations: MEXICO: Oaxaca: L. S. Smith Mex.4 (Z).

LIPPIA ORIGANOIDES H.B.K.

Additional synonymy: Lippia origanoïdes H.B.K. apud Bocq., Adansonia 3: [Rev. Verbenac.] 244. 1863.

Additional & emended bibliography: Bocq., Adansonia 3: [Rev. Verbenac.] 244. 1863; Moldenke, Biol. Abstr. 46: 8464. 1965; Moldenke, Phytologia 13: 363. 1966.

Recent collectors have found this plant growing in sandy soil and report the vernacular name "culantro cimmarón" for it.

Additional citations: COLOMBIA: Goajira: Saravia & Madrinan 2969 (Z).

LIPPIA PALMERI S. Wats.

Additional bibliography: Moldenke, Phytologia 13: 364. 1966.

Recent collectors have found this species growing in rocky desert washes, small arroyos, arroyos near the sea, and in dense brushy scrub. They describe the inflorescence as pendent and the

plant as a straggly shrub 2 m. tall or less. The flowers are described as "white to lavender" on Wiggins, Carter, & Ernst 319 and "pale-lavender" on I. L. Wiggins 15399. Hastings & Turner found it in a small wash with Olneya tesota, Prosopis juliflora, and Franseria ambrosioides. Wiggins, Carter, & Ernst found it associated with Antigonon leptopus, Bursera microphylla, Colubrina glabra, Cyrtocarpa edulis, Ferocactus rectispinus, Forchammeria watsonii, Fouquieria peninsularis, Jatropha cinerea, Lysiloma candida, Machaerocereus gummosus, Pachycereus thurberi, Ruellia sp., Sebastiania sp., and Wilcoxia striata.

Additional citations: MEXICO: Baja California: A. Carter 2667, in part (Du—344052); D. M. Porter 122 (Du—451968), 300 (Du—451965); I. L. Wiggins 15399 (Du—453238), 15461 (Du—453233), 15588 (Du—453249); Wiggins, Carter, & Ernst 319 (Du—504803); Wiggins & Ernst 576 (Du—504804). Sonora: Hastings & Turner 64-54 (Du—507020). CORONADO ISLAND: I. L. Wiggins 17489 (Mi).

LIPPIA PALMERI var. SPICATA Rose

Additional bibliography: Moldenke, Phytologia 13: 364. 1966.

Porter describes this plant as a woody-based shrub, 3 feet tall, growing at the edge of a small arroyo, flowering in February.

Additional citations: MEXICO: Baja California: A. Carter 2667, in part (Du—344052); D. M. Porter 380 (Du—451972).

LIPPIA PEARSONI Moldenke

Additional synonymy: Lippia pearsonii Moldenke apud Anon., Assoc. Etud. Tax. Fl. Afr. Trop. Index 1965: 67. 1966.

Additional bibliography: Moldenke, Phytologia 13: 364. 1966; Anon., Assoc. Etud. Tax. Fl. Afr. Trop. Index 1965: 67. 1966.

LIPPIA PEARSONI var. SESSILIS Moldenke

Additional synonymy: Lippia pearsonii var. sessilis Moldenke apud Anon., Assoc. Etud. Tax. Fl. Afr. Trop. Index 1965: 67. 1966.

Additional bibliography: Moldenke, Phytologia 13: 364. 1966; Anon., Assoc. Etud. Tax. Fl. Afr. Trop. Index 1965: 67. 1966.

LIPPIA PLICATA J. G. Baker

Additional bibliography: Moldenke, Phytologia 13: 364. 1966; Anon., Assoc. Etud. Tax. Fl. Afr. Trop. Index 1965: 67. 1966.

LIPPIA PLICATA var. ACUMINATA (Moldenke) Moldenke

Additional bibliography: Moldenke, Phytologia 13: 365. 1966; Anon., Assoc. Etud. Tax. Fl. Afr. Trop. Index 1965: 67. 1966.

LIPPIA PLICATA var. PARVIFOLIA (Moldenke) Moldenke

Additional bibliography: Moldenke, Phytologia 13: 365. 1966; Anon., Assoc. Etud. Tax. Fl. Afr. Trop. Index 1965: 67. 1966.

LIPPIA POHLIANA Schau.
Additional & emended bibliography: Bocq., Adansonia 3: [Rev. Verbenac.] 244. 1863; Moldenke, Phytologia 13: 365. 1966.

LIPPIA PRINGLEI Briq.
Additional bibliography: Moldenke, Phytologia 13: 349, 351, & 365—366. 1966.
Breedlove found this species growing at an altitude of only 83 meters.
Additional citations: MEXICO: Sinaloa: Breedlove 1572 (Du—500726); Edw. Palmer 1199 (Du—326388).

LIPPIA PSEUDO-THEA (A. St.-Hil.) Schau.
Additional & emended bibliography: Bocq., Adansonia 3: [Rev. Verbenac.] 244. 1863; Moldenke, Phytologia 12: 365—367. 1965.

LIPPIA PUMILA Cham.
Additional bibliography: Moldenke, Phytologia 13: 366. 1966; Moldenke, Biol. Abstr. 47: 3296. 1966.

LIPPIA RECOLLETAE Morong
Additional bibliography: Moldenke, Phytologia 13: 366. 1966.
Woolston describes this plant as an erect aromatic herb, 30—50 cm. tall, growing in sandy soil.
Additional citations: PARAGUAY: L. S. Smith Parag.5 (Rf), Parag.15 (Ac); Woolston 1637 (S).

LIPPIA RECOLLETAE var. PICKELII (Moldenke) Moldenke
Additional bibliography: A. María, Pl. Valle Cochabamb. 2: 42. 1966; Moldenke, Phytologia 13: 366. 1966.

LIPPIA REHMANNI H. H. W. Pearson
Additional bibliography: Moldenke, Phytologia 13: 366—367. 1966; Moldenke, Résumé Suppl. 14: 9. 1966.

LIPPIA ROSMARINIFOLIA Anderss.
Additional & emended bibliography: N. J. Anderss., Vet. Akad. Stockh. 1853: 198. 1854; N. J. Anderss., Galap. Veg. 80. 1859; Robinson & Greenm., Am. Journ. Sci. 150 [ser. 3, 50]: 147. 1895; B. L. Robinson, Proc. Am. Acad. 38: 196. 1902; A. Stewart, Proc. Calif. Acad. Sci., ser. 4, 1: 133—134. 1911; Moldenke, Phytologia 12: 441—443 (1965) and 14: 217. 1967.
The A. Stewart 3309, distributed as L. rosmarinifolia and so cited by me in Phytologia 12: 442 (1965), is actually the type collection of var. latifolia Moldenke.
Material of L. rosmarinifolia has been misidentified and distributed in herbaria under the designations Lipachaeta sp. and Lantana sp. The species has been collected in fruit in January.
There is considerable confusion about the actual publication of this species by Andersson. It appears that the name was first proposed by him in Vet. Akad. Handl. Stockh. 1853: 198,

which, however, was not actually issued until 1854. The work with a similar title, Om Galap. Veg., by the same author, was apparently issued later, with different pagination and dated "1857", but a paper not issued until 1859 is cited therein on page 80, indicating the year 1859 as the earliest that it could have been issued!

Robinson (1902) cites the following specimens not as yet seen by me: Abingdon: Snodgrass & Heller 827 (G). Albemarle: Baur 179 (G), 181 (G), 182 (G); Snodgrass & Heller 147 (G), 168 (G), 233 (G), 251 (G), 280 (G). The Snodgrass & Heller 888, 890, & 896 which he also cites are var. stewarti Moldenke.

Additional & emended citations: GALAPAGOS ISLANDS: Albemarle: Onc 4307 (Gg—459677). Narborough: A. Stewart 3310 (Gg—31213).

LIPPIA ROSMARINIFOLIA var. LATIFOLIA Moldenke

Bibliography: Moldenke, Phytologia 14: 217. 1967.

At first glance this plant looks much like L. salicifolia Anderss., but closer inspection reveals that its leaf-blades are entire and revolute-margined as in typical L. rosmarinifolia, but much wider and plainly elliptic in shape. It is known thus far only from the type specimen, which was cited by me in error as typical L. rosmarinifolia Anderss. in Phytologia 12: 442 (1965).

Citations: GALAPAGOS ISLANDS: James: A. Stewart 3309 (Gg—31211—type).

LIPPIA ROSMARINIFOLIA var. STEWARTI Moldenke

Additional bibliography: B. L. Robinson, Proc. Am. Acad. 38: 196. 1902; Moldenke, Phytologia 12: 442—443. 1965.

Robinson (1902) cites Snodgrass & Heller 888 (G), 890 (G), & 896 (G) under L. rosmarinifolia Anderss., but comments that the leaves on these three collections are strongly toothed. Although I have not as yet seen them, it is obvious that they must belong to the present variety rather than to the typical form of the species.

LIPPIA RUBIGINOSA Schau.

Additional bibliography: Moldenke, Phytologia 12: 445—447 (1965) and 13: 352. 1966.

LIPPIA RUGOSA A. Chev.

Additional bibliography: Hutchinson & Dalz., Fl. W. Trop. Afr., ed. 1, 2 (1): 270. 1931; Meikle in Hutchinson & Dalz., Fl. W. Trop. Afr., ed. 2, 2: 437. 1963; Moldenke, Phytologia 12: 447—448. 1965.

Meikle (1963) refers to the original place of publication of this species as "Mém. Soc. Bot. Fr. 2, 8: 191". He places L. nigeriensis Moldenke in synonymy here and says that the L. adoensis of the Fl. W. Trop. Afr., ed. 1 (1931) is in part L. rugosa. He notes that the species is very similar to L. multiflora Moldenke, but has scabrid leaves with prominent leaf-venation. In his key

he separates them as follows:

Upper surface of leaves smooth to the touch, the venation obscure; stems subglabrous or sparsely appressed-pubescent; apex of floral bractlets very obtuse, shortly mucronate. L. multiflora.

Upper surface of leaves rough to the touch, the venation prominently rugose-reticulate; stems usually distinctly appressed-pubescent; apex of floral bractlets acute or cuspidate..... L. rugosa.

He cites: GUINEA: Chevalier 20410. NORTHERN NIGERIA: Meikle 824, Coombe 9, Hepper 1092, Latilo FHI.37974, Lely 115 & 582, MacGregor 429, Monod 9361 & 9872. SOUTHERN NIGERIA: Hambler 585. BRITISH CAMEROONS: Maitland 1697, Hepper 1269, Keay FHI.28522, Latilo & Daramola FHI.28795.

The species has been collected in anthesis from September to January; in fruit in December and January.

LIPPIA SALICIFOLIA Anderss., Vet. Akad. Handl. Stockh. 1853: 198—199. 1854.

Additional & emended bibliography: N. J. Anderss., Vet. Akad. Handl. Stockh. 1853: 198—199. 1854; N. J. Anderss., Galap. Veg. 80—81. 1859; B. L. Robinson, Proc. Am. Acad. 38: 196. 1902; A. Stewart, Proc. Calif. Acad. Sci., ser. 4, 1: 134. 1911; Moldenke, Phytologia 12: 449—450. 1965.

Usinger found this plant growing in forests. Robinson (1902) cites an unnumbered N. J. Andersson collection from Charles Island in the Gray Herbarium. This is probably part of the type collection, N. J. Andersson 209.

There is considerable confusion about the place and date of the original publication of this species by Andersson. It appears now that the name was first proposed in Vet. Akad. Handl. Stockh. 1853: 198, which, however, was not actually issued until 1854. The work with a similar title by Andersson, Om Galap. Veg., to which I hitherto credited the name, was issued later with a different pagination and dated "1857". However, a paper not issued until 1859 is cited therein on page 80, indicating that 1859 as the earliest possible date of its actual publication!

Additional citations: GALAPAGOS ISLANDS: Charles: Usinger s.n. [17 Feb. 1964] (Z).

LIPPIA SALVIAEFOLIA Cham.

Additional synonymy: Lipia salvifolia Cham. ex Bokerm., Stud. Entomol. 6: 444 & 447, sphalm. 1963.

Additional bibliography: Bokerm., Stud. Entomol. 6: 444 & 447. 1963; Moldenke, Phytologia 13: 367. 1966.

Bokermann (1963) found chrysomelid [caterpillar-dung leaf] beetles, Exema variopicta Monros, in large numbers on the leaves of this species, especially on new branches, as well as on those of Lantana hypoleuca Briq., in November, December, and January.

Additional citations: BRAZIL: São Paulo: L. S. Smith Bras.70 (Rf).

LIPPIA SAVORYI Meikle

Additional bibliography: Meikle in Hutchinson & Dalz., Fl. W. Trop. Afr., ed. 2, 2: 437. 1963; Moldenke, Phytologia 13: 367. 1966.

Meikle (1963) describes this species as an erect woody perennial herb or subshrub, to about 5 feet tall, the leaves grayish-green, very scabrid, the floral bractlets pale-green, densely white-villous, and the corollas white, with a yellow throat, flowering throughout the year, fruiting in January and February. He cites: GHANA: Harris s.n. NORTHERN NIGERIA: Coombe 112, Dalziel 177, Gregory 281, Lely 69, 241, 320, & P.40, McClintock 244, Meikle 1059 & 1344, presumably all in the Kew herbarium.

LIPPIA SCAPOSA Briq.

Additional bibliography: Moldenke, Phytologia 12: 480. 1965; Moldenke, Biol. Abstr. 47: 3296. 1966.

LIPPIA SCHLIEBENI Moldenke

Additional bibliography: Moldenke, Phytologia 13: 344, 358, & 367. 1966.

LIPPIA SCHOMBURGKIANA Schau.

Emended synonymy: Lippia microphylla Benth. ex Bocq., Adansonia 3: [Rev. Verbenac.] 244, in syn. 1863 [not L. microphylla Cham., 1832, nor R. A. Phil., 1865].

Additional & emended bibliography: Bocq., Adansonia 3: [Rev. Verbenac.] 244. 1863; Moldenke, Phytologia 12: 486—488 (1965) and 13: 352 & 354. 1966.

LIPPIA SIDOIDES Cham.

Additional synonymy: Lippia sidoïdes Cham. ex Bocq., Adansonia 3: [Rev. Verbenac.] 244. 1863; Moldenke, Phytologia 13: 367. 1966.

LIPPIA STACHYOIDES Cham.

Additional bibliography: Moldenke, Phytologia 12: 498—500. 1966.

Additional citations: BRAZIL: São Paulo: G. Eiten 1575 [plant no. 1] (N).

LIPPIA SUBSTRIGOSA Turcz.

Additional bibliography: Moldenke, Phytologia 13: 351 & 367—368. 1966; Moldenke, Résumé Suppl. 14: 2. 1966.

Breedlove found this plant growing on steep rocky slopes and on slopes with Quercus and Pinus.

Additional citations: MEXICO: Chiapas: Breedlove 9368 (Ws), 9476 (Ws). HONDURAS: Morazán: Williams & Molina R. 23231 (Du—497200).

LIPPIA SUFFRUTICOSA (Griseb.) Kuntze

Additional bibliography: Moldenke, Phytologia 12: 505—506

(1966) and 13: 345. 1966.

LIPPIA TEGULIFERA var. OVATA Briq.
Additional bibliography: Moldenke, Phytologia 13: 368. 1966.
Additional citations: BRAZIL: Paraná: L. S. Smith Bras.62 (Z).

LIPPIA TRISTIS Briq.
Additional bibliography: Moldenke, Phytologia 13, 12--16, 29, 347, & 362. 1966.

LIPPIA TURBINATA Griseb.
Additional bibliography: Moldenke, Phytologia 13: 17—26 & 345. 1966.
The Monetti s.n. [Herb. Inst. Miguel Lillo 32085], distributed as L. turbinata, is actually f. magnifolia Moldenke, while the H. H. Bartlett 19237, cited by me in a previous installment of these notes, is actually f. angustifolia Osten.

LIPPIA TURBINATA f. ANGUSTIFOLIA Osten
Additional bibliography: Moldenke, Phytologia 13: 21 & 23—24. 1966.
The Bartlett specimen cited below was erroneously cited by me in a previous installment of these notes as typical L. turbinata Griseb.
Additional citations: ARGENTINA: Córdoba: H. H. Bartlett 19237 (W—1904407).

LIPPIA TURBINATA f. MAGNIFOLIA Moldenke
Additional bibliography: Hocking, Excerpt. Bot. A.9: 367. 1965; Moldenke, Phytologia 13: 21 & 24—26. 1966.
Additional citations: ARGENTINA: Tucumán: Monetti s.n. [Herb. Inst. Miguel Lillo 32085] (Du—317600).

LIPPIA TURNERIFOLIA Cham.
Additional bibliography: Moldenke, Phytologia 13: 348 & 368. 1966.
L. S. Smith describes this plant as 1 1/2 feet tall, the flowers opening yellow and later becoming reddish-brown in the center, growing along roadsides, blooming in November. The Herb. Herter 82594, distributed as L. turnerifolia, is actually L. morongii Kuntze.
Additional citations: BRAZIL: Paraná: L. S. Smith Bras.66 (Rf). PARAGUAY: L. S. Smith Parag.12 (Rf).

LIPPIA UKAMBENSIS Vatke
Additional bibliography: Moldenke, Phytologia 13: 31—32. 1966.
Milne-Redhead & Taylor describe this plant as a shrub, to 2 m. tall, very aromatic, the stems green, soon turning brown, the pedicels square, the leaves deep dull-green above, paler beneath, the veins and veinlet reticulation sunken above and raised beneath, the bracts and calyx yellow-green, turning green with age, the corolla

creamy-white with a yellow throat, turning black and persisting, and the anthers dull-yellow, abundant at the edge of clumps of upland rain forests, at 1890 m. altitude, blooming in July. Material has been misidentified and distributed in herbaria as L. javanica (Burm. f.) Spreng.

Additional citations: TANGANYIKA: Milne-Redhead & Taylor 11049 (S).

LIPPIA UMBELLATA Cav.

Additional bibliography: Moldenke, Phytologia 13: 350, 352, 365, & 368. 1966.

The Janzen s.n. [13 January 1964] and the Weber & Charette 11939, distributed as L. umbellata, are actually L. hypoleia Briq., while Edw. Palmer 1199 is L. pringlei Briq.

Additional citations: MEXICO: Federal District: J. Rzedowski 21961 (Mi). Michoacán: King & Soderstrom 5161 (N).

LIPPIA VELUTINA Schau.

Additional & emended bibliography: Bocq., Adansonia 3: [Rev. Verbenac.] 245. 1863; Moldenke, Phytologia 13: 163—164 & 363. 1966.

LIPPIA VERNONIOIDES Cham.

Additional bibliography: Moldenke, Phytologia 13: 165—167. 1966.

Additional citations: BOLIVIA: El Beni: H. H. Rusby 927 (Ws).

LIPPIA WHYTEI Moldenke

Additional bibliography: Moldenke, Phytologia 13: 170—171 & 358. 1966; Moldenke, Résumé Suppl. 13: 4. 1966.

LIPPIA WILMSII H. H. W. Pearson

Additional bibliography: Moldenke, Phytologia 13: 171—177, 358, & 364. 1966.

LIPPIA WOODII Moldenke

Additional bibliography: Moldenke, Phytologia 13: 174 & 176—177. 1966.

LIPPIA YUCATANA Loes.

Additional bibliography: Moldenke, Phytologia 13: 177—179 & 362. 1966.

ADDITIONAL NOTES ON THE GENUS CORNUTIA. II

Harold N. Moldenke

CORNUTIA Plum.

Additional & emended bibliography: Westm. in L., Orat. Tellur. Habit. Incr. 59. 1744; A. L. Juss., Gen. Pl., ed. 1, 107--108 (1789) and ed. 2, 120--121. 1791; Guill., Enum. Pl. Déc. Voy. Iles Société 210. 1837; Benth., Bot. Voy. Sulphur 154. 1846; Bocq., Adansonia 2: 88, 111, 113, 114, 118, 119, 121, 123, 125, 126, 131, 133, 137--139, & 147 (1862) and 3: 178, 180, 181, 184, & 233--234, pl. 12. 1863; Bocq., Rev. Verbenac. 88, 111, 113, 114, 118, 119, 121, 123, 125, 126, 131, 133, 137--139, 147, 178, 180, 181, 184, & 233--234, pl. 12. 1863; Turcz., Bull. Soc. Imp. Nat. Mosc. 36 (2): 220 & 222--223. 1863; Griseb., Cat. Pl. Cub. 216. 1866; A. Stewart, Proc. Calif. Acad. Sci., ser. 4, 1: 395. 1912; Loes., Verh. Bot. Ver. Brand. 53: 81 [Abhandl. 246]. 1912; P. C. Standl., Contrib. U. S. Nat. Herb. 23: 1235, 1251, & 1252. 1924; K. V. O. Dahlgren, Svensk. Bot. Tidsk. 32: 231. 1938; A. W. Hill, Ind. Kew. Suppl. 9: 5. 1938; Robledo, Lecc. Bot. 2: 499. 1940; C. L. Lundell, Contrib. Univ. Mich. Herb. 8: 61 & 90. 1942; Moldenke, Phytologia 5: 95 (1954), 5: 153, 297, & 317 (1955), and 5: 393 & 409. 1956; Angely, Cat. Estat. Gen. Bot. Fan. 17: 3. 1956; Angely, Fl. Paran. 7: 4. 1957; Moldenke, Phytologia 5: 476, 478, & 509 (1957), 6: 98 (1957), 6: 199, 232, & 242 (1958), and 6: 509. 1959; Anon., Kew Bull. Gen. Index 1929-1956, 84. 1959; Angely, Liv. Gen. Bot. Bras. 35 & 42. 1960; Runner, Rep. G. W. Groff Coll. 362. 1961; Moldenke, Phytologia 7: 376--399. 1961; Moldenke, Biol. Abstr. 36: 31141. 1961; Soukup, Biota 4: 180. 1962; Angely, Fl. Bacia Paran. 22: 39. 1962; Menninger, Flow. Trees World 283, 313, 316, & 326, pl. 414. 1962; Shelford, Ecol. N. Am. 442 & 559. 1963; Hocking, Excerpt. Bot. A6: 533. 1963; Langman, Select. Guide Lit. Flow. Pl. Mex. 515, 516, & 1010. 1964; Soukup, Biota 5: 123 & 130. 1964; Neal, In Gard. Hawaii, ed. 2, 721. 1965; Moldenke, Phytologia 12: 6 (1965) and 13: 324 & 334. 1966; Anon., Gen. Costa Ric. Phan. 10. 1966; Fournier, Imp. Tree Fam. Costa Ric. 13. 1966.

Westmann (1744) places this genus in his group "Plantae baccatae". Dahlgren (1938) places it in the Labiatae. The generic names Midi Herm., Sambucus Burm., and Cornutioides L., listed by Angely (1956) as synonyms of Cornutia, actually belong in the synonymy of Premna. Soukup (1964) records the vernacular names "toe " and "ulape" from Peru -- the former being applied also to Datura.

Some notes by Turczaninow (1863) are of interest: "Cornutia e prov. Carabobo Venezuelae, Linden No. 1457, eadem videtur cum specimine ejusdem collectionis sub No 1398 et cum mexicana Galeotti No 757. Omnes ad C. grandifoliam Schauer pertinent. Variat

haec planta panicula descriptione lineari-lanceolata et late ovata pyramidata. Habitu proxima sed staminibus omnibus fertilibus servatur in collectione mexicana Jurgensenii sub No 533. Generis propinqui sed verosimiliter distincti sunt specimina collectionis Sellowianae, No 510, filamentis duobus anantheris, foliis glabris, inflorescentia racemosa pauciflora, floribus multo majoribus coriaceis et praesertim calycis lobo inferiore cucullato-gibboso divergentia. Ovarium in paucis floribus, partim corruptis, videtur quadrilobus fere Acerae. An hujus generis species brasiliensis?" The Linden 1398 to which he refers is C. odorata var. colombiana Moldenke and 1457 is C. microcalycina Pavon & Moldenke, while Galeotti 757 is C. grandifolia var. purpusi Moldenke. Jurgensen 533 and Sellow 510 have not as yet been seen by me.

CORNUTIA COERULEA (Jacq.) Moldenke

Additional bibliography: Moldenke, Phytologia 7: 381—382. 1961.

One of the original cotypes of this species from the Jacquin herbarium, preserved in the Vienna herbarium, was photographed there by Macbride as his type photograph number 34306.

Additional & emended citations: CULTIVATED: Austria: Herb. Jacquin f. s.n. [Macbride photos 34306] (W—photo of cotype). Germany: Herb. Bernhardi s.n. (E—118976).

CORNUTIA GRANDIFOLIA (Schlecht. & Cham.) Schau.

Additional synonymy: Cornutia grandifolia Schau. ex Turcz., Bull. Soc. Imp. Nat. Mosc. 36 (2): 222, in nota. 1863. Cornutia grandifolia (Cham. & Schlecht.) Schau. apud A. Stewart, Proc. Calif. Acad. Sci., ser. 4, 1: 395. 1912.

Additional bibliography: Benth., Bot. Voy. Sulphur 154. 1846; Loes., Verh. Bot. Ver. Brand. 53: 81 [Abhandl. 246]. 1912; A. Stewart, Proc. Calif. Acad. Sci., ser. 4, 1: 395. 1912; P. C. Standl., Contrib. U. S. Nat. Herb. 23: 1251. 1924; E. J. Salisb., Ind. Kew. Suppl. 10: 61. 1947; Moldenke, Phytologia 7: 382—387. 1961; Menninger, Flow. Trees World 283, pl. 414. 1962; Shelford, Ecol. N. Am. 442 & 559. 1963; Neal, In Gard. Hawaii, ed. 2, 721. 1965.

Additional illustrations: Menninger, Flow. Trees World pl. 414 [in color]. 1962.

Recent collectors describe this plant as a shrub, 15—20 feet tall, or a tree, 18—25 feet tall, the foliage and flowers fragrant, and the leaves with a brownish aspect, growing along trails, on hillsides and steep wooded slopes or slopes with Pinus and Liquidambar, at altitudes of 60 to 5500 feet, flowering also in March and September. A wood sample accompanies Stork 4526. The flowers are described as "blue" on Breedlove 10094 & 10366 and on Gilly & Hernandez Xolocotzi 172, "purple" on Stork 4526, "dark-purple" on Stork 3009, and "bright reddish-violet" on Rodríguez C.427

Stewart (1912) describes the plant as "bushes about 8 feet tall on the sides of cliffs and on the banks of streams near Wafer Bay (No. 318). Further distrib. S. Mex.", but his specimen is the type collection of C. microcalycina var. anomala Moldenke. Menninger (1962) affirms that C. grandifolia can withstand temperatures as low as 25°F. — "although rather tender and sometimes killed to the ground by frost, Cornutia recovers quickly and comes back from the roots." Shelford (1963) records the vernacular name "cuatro caras".

Turczaninow (1863) cites Linden 1398 & 1457 from Venezuela and Galeotti 757 and Jurgensen 533 from Mexico. The first of these, however, is C. odorata var. colombiana Moldenke, the second is C. microcalycina Pavon & Moldenke, the third is C. grandifolia var. purpusi Moldenke, and the fourth has not as yet been seen by me. The Liebmann 11306, Lévy 1177, C. Hoffmann 117 & 517, H. Pittier 237 bis, Stork 508, and Tonduz s.n. [Tucurrique, Las Vueltas], all cited by me in my 1936 work as from "Province undetermined", have now been localized and are re-cited below.

Material of this taxon has been misidentified and distributed in herbaria as C. grandifolia var. quadrangularis Ørst. & Moldenke. On the other hand, the Paray 560, distributed as C. grandifolia, is actually C. lilacina var. velutina Moldenke.

Additional & emended citations: MEXICO: Chiapas: Breedlove 6469 (Z), 10094 (Rf), 10366 (Ac); Gilly & Hernandez Xolocotzi 172 (Mi); Paray 561 (Ip). Oaxaca: Liebmann 11306 (W—1315087); Martínez & Calderón 15 (Ca—938170). Vera Cruz: Plunkett 131 (F—671130); Schiede 81 (E—118978—cotype). GUATEMALA: Alta Verapaz: H. V. Johnson 895 (W—1084015); Türckheim 248 (W—1323340), 7935 (W—398410, W—1323335), II.400 (W—860706). El Petén: Contreras 2437 (Ld, S); C. L. Lundell 16450 (Ld). Izabal: P. C. Standley 24863 (W—1150474). BRITISH HONDURAS: C. S. Brown 13 (F—585394, Y—13032); Gentle 7968 (Ld, S), 9150 (Ld); Schipp 265 (Ca—396492, E—988623, F—713239, W—1494694). HONDURAS: Atlántida: A. M. Chickering 23 (F—689825); E. R. Mitchell 117 (F—580545, W—1430244); Salvoza 809 (F—710562); P. C. Standley 53342 (F—582699, W—1407667). Colon: Johansen 2 (F—572610). Cortés: Record & Kuylen H.6 (W—1315362, Y—9952). Province undetermined: Carleton 489 [Comagalpa] (E—921010, W—1208472). EL SALVADOR: San Salvador: Calderón 474 (W—1151455); P. C. Standley 22990 (W—1138699). NICARAGUA: Managua: Maxon, Harvey, & Valentine 7404 (W—1181115). Rivas: Lévy 1177 (Cb). Zelaya: Englesing 293 (F—585038, Y—13275). COSTA RICA: Cartago: R. L. Rodríguez C. 427 (Ca—95600, Mi); Stork 508 (W—1167057), 4526 (Mi); Tonduz s.n. [Tucurrique, Las Vueltas] (W—1323330). Puntarenas: Pittier & Tonduz 9714 (W—1323327); Tonduz s.n. [Herb. Inst. Physico-geogr.

Nat. Costaric. 9714] (W—1323326). San José: J. A. Echeverria 364 (Ca—776219); C. Hoffmann 117 (Cp), 517 (B, B, B, B); H. Pittier 237 bis (W—1323329); Stork 3009 (Mi). Province undetermined: Kuntze 2201 (F—297678, F—297691). PANAMA: Panamá: P. C. Standley 26662 (W—1217135).

CORNUTIA GRANDIFOLIA var. INTERMEDIA Moldenke

Additional bibliography: Moldenke, Phytologia 7: 384—385. 1961.

The flowers are described as "blue" on Breedlove 11399. This collector found the plant growing on wooded slopes, flowering in August. Smith describes the buds as dark-violet in color.

Additional & emended citations: GUATEMALA: Alta Verapaz: Türckheim 935 (W—1323338). Escuintla: Seler & Seler 2560 (W—1205547). Guatemala: Garcia S. 1472 (F—663850). Izabal: H. Pittier 8538 (W—1013483); P. C. Standley 24398 (W—1150040). Quezaltenango: Holway 822 (W—863011, W—863012). Sacatepéquez: Breedlove 11399 (Z); Tejada 243 (W—862378). Santa Rosa: Heyde & Lux 2957 (E—118977, W—57683, W—480107, W—1323333); Lehmann 1638 (W—1323331). Sololá: Shannon 135 (W—57684, W—1323332). Department undetermined: Heyde 79 [337] (W—248336). HONDURAS: Santa Bárbara: Thieme 5411 (F—574645—isotype, W—246644—isotype, W—1323339—type). NICARAGUA: Managua: Maxon, Harvey, & Valentine 7531 (W—1181246). COSTA RICA: Alajuela: A. F. Smith 13 [Stork 4113] (Ld), 14 [Stork 4113] (Mi). Guanacaste: A. R. Moldenke 1323 (Rf). PANAMA: Bocas del Toro: G. P. Cooper 529 (F—579205, Y—12149). Coclé: R. S. Williams 963 (W—678336). Panamá: P. C. Standley 25853 (W—1216677).

CORNUTIA GRANDIFOLIA var. NORMALIS (Kuntze) Moldenke

Additional bibliography: Moldenke, Phytologia 7: 385—386. 1961.

The flowers are described as "bluish-violet" on C. O. Erlanson 311 and "blue-purple" on Bartlett & Lasser 16528.

Additional & emended citations: COSTA RICA: Cartago: Tonduz s. n. [Herb. Inst. Physico-geogr. Nat. Costaric. 11507] (W—333918, W—365936, W—577453, W—1323336, W—1323337). Puntarenas: Maxon 584 (W—1323334); A. R. Moldenke 1322 (Rf); H. Pittier s.n. [Herb. Inst. Physico-geogr. Nat. Costaric. 11979] (W—1323325); Tonduz 4512 (W—1323328). PANAMA: Bocas del Toro: Dunlap 575 (F—689803, W—1405497). Canal Zone: Bailey & Bailey 551 (F—703162); Bartlett & Lasser 16528 (Mi); Gervais 122 (W—716503); Kuntze 1932 (E—118973—isotype); Maxon & Harvey 6610 (W—1180353); H. Pittier 3702 (W—678770), 6711 (W—716765); P. C. Standley 25471 (W—1216484). Chiriquí: Cooper & Slater 225 (F—573158, W—1318433, Y—10578). Panamá: Bartlett & Lasser 16329 (Mi); Maxon & Harvey 6661 (W—

1180402); H. Pittier 4617 (W--679772); Riley 120 (W--1319063). PEARL ISLANDS: San José: C. O. Erlanson 311 (Mi). CULTIVATED: Hawaiian Islands: Hutchison 2744 [Wahiawa Bot. Gard. 5662] (Ac, W--2470767).

CORNUTIA GRANDIFOLIA var. PURPUSI Moldenke

Additional synonymy: Hosta longifolia Humb. & Kunth ex Benth., Bot. Voy. Sulphur 154. 1846.

Additional bibliography: Benth., Bot. Voy. Sulphur 154. 1846; P. C. Standl., Contrib. U. S. Nat. Herb. 23: 1252. 1924; Moldenke, Phytologia 7: 386--387. 1961.

The flowers are described as "purple" on Breedlove 6287 and as "blue" on J. V. Santos 3054. Recent collectors refer to the plant as a shrub, 4 m. tall, growing at altitudes of 2200--3600 meters, flowering in June and July. The Tessmann 4046, distributed as this variety, is actually Sanango durum Bunting & Duke, in the Loganiaceae.

Additional & emended citations: MEXICO: Chiapas: Breedlove 6287 (Z); E. W. Nelson 3011 (W--233319, W--233320). Vera Cruz: Botteri 864 (W--57685), 1091 (E--118988, F--689828, W--57686, W--242022, W--242023); Mohr 323 (W--771906); E. W. Nelson 481 (W--569125); Purpus 2647 (Ca--101607--type, E--118975--isotype, F--343993--isotype, W--841773--isotype), 4445 (Ca--143290), s.n. [Veracruz, 1922] (Ca--402975); J. V. Santos 3054 (Mi).

CORNUTIA GRANDIFOLIA var. QUADRANGULARIS Ørst. & Moldenke

Additional bibliography: Moldenke, Phytologia 7: 387. 1961.

The Rodríguez C. 427, distributed as this variety, is actually typical C. grandifolia (Schlecht. & Cham.) Schau.

Emended citations: COSTA RICA: Cartago: Ørsted 11200 (W--1315040--type).

CORNUTIA GRANDIFOLIA var. STORKII Moldenke

Additional bibliography: Moldenke, Phytologia 7: 387--388. 1961.

Emended citations: COSTA RICA: San José: P. C. Standley 34134 (W--1226560); Stork 1743 (F--598926--type), 3009 (F--598926).

CORNUTIA JAMAICENSIS Moldenke

Additional bibliography: Moldenke, Phytologia 7: 388. 1961.

The Proctor 19689, distributed as this species and so cited by me in 1961, proves to represent C. thyrsoidea Banks & Moldenke instead. Dr. Stearn agrees with this re-identification.

Emended citations: JAMAICA: W. Harris 9252 (F--212271--isotype, W--524685--isotype).

CORNUTIA LATIFOLIA (H.B.K.) Moldenke

Additional & emended bibliography: C. L. Lundell, Contrib.

Univ. Mich. Herb. 8: 61. 1942; Moldenke, Phytologia 7: 388--389. 1961.

Recent collectors describe this plant as a shrub or small tree, to 6 m. tall, the stem 12 cm. in diameter, the flowers with a fetid odor, fruiting in September, found in secondary growth, in arid scrub forests, and along roadsides in limestone hills. The flowers are described as "lavender-blue" on Gilly & Hernandez Xolocotzi 109, "grayish-blue" on Gilly & Hernandez Xolocotzi 263, "purplish" on Matuda 3398, and "pale purple-blue" on R. M. King 992. The last-mentioned collector notes that it is a "common tree growing in sandy loam in open sun" in Vera Cruz. A vernacular name reported for it is "expangege".

Additional & emended citations: MEXICO: Campeche: Sauer & Gade 3184 (Ws); Steere 1741 (F--668594). Chiapas: Matuda 3807 (Mi). Tabasco: Gilly & Hernandez Xolocotzi 109 (Mi), 263 (Mi); Matuda 3398 (Mi, Rf). Vera Cruz: R. M. King 992 (Mi); Orcutt 6330 (W--1266592). Yucatán: Degener & Degener 26794 (N, W, Z); G. F. Gaumer 822 (E--118983, F--36625, W--268379); Lundell & Lundell 7888 (Rf); Steere 1458 (E--1087185). GUATEMALA: El Petén: Aguilar Hidalgo 54 (E--1067851, F--713088). BRITISH HONDURAS: Gentle 16 (F--696392), 186 (F--662519, W--1585899), s.n. [Lundell 4746] (F--683520); W. C. Meyer 38 (F--713307); Winzerling III.2 (W--1266652).

CORNUTIA LATIFOLIA f. ALBA Moldenke

Additional bibliography: Moldenke, Phytologia 7: 389. 1961; Langman, Select. Guide Lit. Flow. Pl. Mex. 516. 1964.

CORNUTIA LILACINA Moldenke

Additional synonymy: Cornutia liliacea Moldenke, Résumé Suppl. 6: 9, in syn. 1963.

Additional bibliography: Moldenke, Phytologia 5: 95 (1954) and 7: 389--390. 1961; Moldenke, Résumé Suppl. 6: 9. 1963.

Recent collectors describe this plant as a shrub, 4 m. tall, or a liana to 10 m. long, growing in forests and on creek banks, blooming also in July. The flowers are described as "purple" on Williams & Molina R. 10100, "blue" on Williams & Molina R. 10274, and "violet" on Molina R. 83.

The Molina R. 12981, distributed as C. lilacina, is actually var. velutina Moldenke.

Additional & emended citations: GUATEMALA: Zacapa: C. C. Deam 6383 (E--118974--type, W--579655--isotype). HONDURAS: El Paraíso: Williams & Molina R. 10274 (Ca--729307, Mi, Rf). Morazán: Molina R. 83 (Ca--792704, Rf); Williams & Molina R. 10100, in part (Ca--729291, Mi). Yoro: J. B. Edwards P.648 (Ca--522683, F--688146, W--1588609). EL SALVADOR: La Libertad: Calderón 823 (W--1151780).

CORNUTIA LILACINA var. VELUTINA Moldenke

Additional bibliography: Moldenke, Phytologia 5: 95 (1954), 7:

390 (1961), and 14: 422. 1967.

Recent collectors describe this plant as a shrub, 2 m. tall, fruiting in September. Molina R. reports it "frequent in wet matorrales", while P. H. Allen calls it "infrequent" and Allen & Severen refer to it as "occasional" in the badlands of El Salvador. The flowers are described as "blue" on Allen & Severen 6923 and as "deep-violet" on P. H. Allen 7073.

Through a typographic error, the type collection of this variety is cited in Phytologia 7: 390 (1961) as "0.385". Material has been misidentified and distributed in herbaria as C. grandifolia (Schlecht. & Cham.) Schau. and as typical C. lilacina Moldenke.

Additional & emended citations: HONDURAS: Comayagua: J. B. Edwards P.385 (Ca—522721—isotype, F—713810—isotype, W—1588747—isotype). Lempira: Molina R. 12981 (W—2445627). Morazán: Williams & Molina R. 10100, in part (Rf). Santa Rosa: Paray 560 (Ip). EL SALVADOR: Sonsonate: P. H. Allen 7073 (Rf); Allen & Severen 6923 (Rf).

CORNUTIA MICROCALYCINA Pavon & Moldenke

Additional & emended bibliography: E. J. Salisb., Ind. Kew. Suppl. 10: 61 & 114. 1947; Moldenke, Mem. N. Y. Bot. Gard. 9: 176. 1955; Moldenke, Phytologia 7: 390—391 (1961) and 14: 421 & 422. 1967.

The flowers on I. L. Wiggins 10924 are described as "purple", and the plant is said to grow "over 6 m. tall", fruiting in October. The Gilmartin 597, distributed under this name, is actually var. pulverulenta Moldenke.

Additional & emended citations: COLOMBIA: Cauca: B. T. Lehmann 5094 (F—578229). ECUADOR: Chimborazo: Rimbach 100 (F—666797, Y—22810). El Oro: I. L. Wiggins 10924 (Du—312192). Guayas: Gilmartin 711 (W—2428446). PERU: Junín: Killip & Smith 26133 (W—1460129).

CORNUTIA MICROCALYCINA var. ANOMALA Moldenke

Additional bibliography: A. Stewart, Proc. Calif. Acad. Sci., ser. 4, 1: 395. 1912; Moldenke, Phytologia 7: 391 (1961) and 14: 422. 1967.

Stewart (1912) cites this taxon as "C. grandifolia (Cham. & Schlecht.) Schau."

Emended citations: PANAMA: Panamá: Goldman 1896 (W—716154).

CORNUTIA MICROCALYCINA var. PULVERULENTA Moldenke

Additional bibliography: Moldenke, Phytologia 7: 391—392. 1961.

Recent collectors describe this plant as an aromatic bush, half-shrub, or shrub, 2—5 m. tall, growing in virgin forests and seasonal rainforests, flowering in March, July, and August, and fruiting in August. The corolla is described as "violet-blue" on

Harling 4566, "violet" on Jativa & Epling 470, and "royal blue with white hairs" on Cazalet & Pennington 5259. Material has been misidentified and distributed in herbaria as C. microcalycina Pavon & Moldenke and as a member of the Labiatae.

Additional & emended citations: PANAMA: Canal Zone: Johansen 41 (W--1167493); H. Pittier 5690 (W--715977). COLOMBIA: Antioquia: Metcalf & Cuatrecasas 30194 (W--1833442). Boyacá: Lawrance 764 (E--1068398, F--681054, W--2324130). Cauca: F. C. Lehmann 9018 (F--559916--isotype). ECUADOR: Esmeraldas: Gilmartin 597 (W--2428431); Harling 4566 (S), 4677 (S); Jativa & Epling 442 (La), 470 (La--53177), 749 (La--53580). Guayas: A. S. Hitchcock 20492 (W--1195416). Los Ríos: Asplund 5504 (Gg--354514, W--1930541). Pichincha: Cazalet & Pennington 5259 (N, W--2405728).

CORNUTIA OBOVATA Urb.

Additional bibliography: Moldenke, Phytologia 5: 317 (1955) and 7: 392--393. 1961.

Emended citations: PUERTO RICO: Sintenis 2022 (E--118982--isotype, F--79572--isotype, W--403508--isotype).

CORNUTIA ODORATA (Poepp. & Endl.) Poepp.

Additional bibliography: Moldenke, Phytologia 5: 152 (1955) and 7: 393. 1961; Soukup, Biota 4: 180. 1962; Moldenke, Phytologia 13: 324 (1966) and 14: 421 & 422. 1967.

Soukup (1962) reports the additional vernacular names "huitoto", "toe", and "ulpe" for this species.

The type specimen, Poeppig 2448, in the Delessert Herbarium at the Conservatoire et Jardin Botaniques in Geneva, was photographed there by Macbride as his type photograph number 7885. The Asplund 5504 and Cazalet & Pennington 5259, distributed as this species, are actually C. microcalycina var. pulverulenta Moldenke. The United States National Herbarium sheet of Asplund 8935 is actually Aegiphila elegans Moldenke.

Additional & emended citations: PERU: Loreto: Klug 394 (W--1455396), 662 (F--630012, W--1455661), 2159 (E--1040446, F--668862, W--1456802); Poeppig 2448 [Macbride photos 7885] (F--645726--photo of type, W--photo of type); Ll. Williams 8223 (F--623347). San Martín: Klug 4004 (W--1458427).

CORNUTIA ODORATA var. CALVESCENS Moldenke

Additional bibliography: Moldenke, Phytologia 7: 394. 1961.

Steyermark describes this plant as a tree, 3 m. tall, the leaf-blades firmly membranous, dull-green above, pale-green beneath with raised venation, the fruiting-rachis tetragonal, and the fruit dull blue-lavender.

Additional citations: COLOMBIA: Caldas: Sneidern 5232 (Mi), 5432 (W--2056616). VENEZUELA: Miranda: J. A. Steyermark 90054 (Z).

CORNUTIA ODORATA var. COLOMBIANA Moldenke

Additional bibliography: Moldenke, Phytologia 7: 394—395 (1961) and 14: 421 & 422. 1967.

The type specimen of this taxon, Triana 2068, in the herbarium of the Naturhistorisches Museum in Vienna, was photographed there by Macbride as his type photograph number 34305. The plant has been collected in anthesis also in December.

Additional & emended citations: COLOMBIA: Bolívar: Curran 160 (W—537311). Cundinamarca: Mutis 873 (F—712616, W—1562702); Triana 2068 [Macbride photos 34305] (W—photo of type). Tolima: Juzepczuk 6867 (W—1444496); F. C. Lehmann B.T.1108 (F—559867); F. W. Pennell 3371 (W—1042802).

CORNUTIA PUBESCENS Gaertn. f.

Additional & emended bibliography: Bocq., Adansonia 2: 126 (1862) and 3: 137 & 234, pl. 12. 1863; Bocq., Rev. Verbenac. 126, 137, & 234, pl. 12. 1863; Moldenke, Phytologia 7: 395. 1961.

CORNUTIA PYRAMIDATA L.

Additional bibliography: Bocq., Adansonia 3: [Rev. Verbenac.] 234. 1863; Griseb., Cat. Pl. Cub. 216. 1866; P. C. Standl., Contrib. U. S. Nat. Herb. 23: 1251. 1924; A. W. Hill, Ind. Kew. Suppl. 9: 5. 1938; K. V. O. Dahlgren, Svensk. Bot. Tidsk. 32: 231. 1938; Jiménez, List Nom. Vernac. 8. 1961; Moldenke, Phytologia 7: 395—398. 1961.

Recent collectors describe this plant as a shrub or tree, 2—10 m. tall, the trunk 20 cm. in diameter, the leaves aromatic, and the fruit black when mature, growing in dry woodlands, low windswept woods on headlands, Copernicia savannas on gray soil, and the edges of thickets in alluvial soil, at 420 meters altitude. The flowers are described as "blue" on J. S. Beard 502, "lavender" on Webster, Ellis, & Miller 9079, and "bluish-purple" on G. L. Webster 3877.

Dahlgren (1938) places this taxon in the Labiatae. Jiménez (1961) records the vernacular name "palo vidrio" for it. The Gilly & Hernandez Xolocotzi 109, distributed under this name, is actually C. latifolia (H.B.K.) Moldenke, while Lawrance 764 is C. microcalycina var. pulverulenta Moldenke.

Additional & emended citations: CUBA: Oriente: Pollard, Palmer, & Palmer 193 (W—403120); Shafer 3490 (F—286225, W—697474), 3988 (F—286328, W—697615), 8303 (W—696505); G. L. Webster 3877 (Mi); C. Wright 3178 (E—118984). HISPANIOLA: Dominican Republic: Abbott 1452 (W—1078623), 2558 (W—1145721), 2756 (W—1147222), 2892 (W—1147334); Eggers 1538 (W—1323341); Faris 85 (W—1049404); Fuertes 102 (E—706687, F—385116, W—658193); Raunkiaer 1119 (W—1110135); Sauer 2046 (Ws); Wright, Parry, & Brummel 222 (W—57687), 357 (F—575086). PUERTO RICO: Eggers 426 (W—1159324), 626 (W—1323345). WINDWARD ISLANDS: Grenada: Eggers 6296 (W—

1323344). Martinique: A. Duss 1965 (W—849741); R. F. Finch 28 (Mi); Hahn 899 (Ca—332487, W—57688), s.n. [1870] (F—367191); Kohaut s.n. [Sieber Fl. Mart. 158] (E—118980); Stehlé & Stehlé 4474 (W—2453688), 5937 (W—2453685), 6141 (W—2453641), 5875 (W—2453687). St. Lucia: J. S. Beard 502 (Ca—797552). LEEWARD ISLANDS: Dominica: Stehlé & Stehlé 6413 (W—2453686). Guadeloupe: A. Duss 2384 (W—849815); H. Stehlé 2759 (W—2453706); Webster, Ellis, & Miller 9079 (Mi). CULTIVATED: Trinidad: W. E. Broadway s.n. [Trin. Bot. Gard. Herb. 1376] (W—1323342); Trin. Bot. Gard. Herb. 1949 (W—1323343); Warming 185 (W—1234846).

CORNUTIA PYRAMIDATA var. ISTHMICA Moldenke

Additional bibliography: Moldenke, Phytologia 7: 398—399. 1961.

Emended citations: MEXICO: Campeche: C. L. Lundell 852 (Ca—486942—isotype, E—1017100—isotype, F—700445—isotype, W—1494712—isotype). Vera Cruz: C. D. Mell s.n. [Minatitlan] (W—1406477). GUATEMALA: El Petén: Cook & Martin 128 (W—1084608); C. L. Lundell 3450 (F—685306). BRITISH HONDURAS: C. L. Lundell 41 (F—598950, W—149099), 104 (F—598051), 433 (E—980201, F—712045, W—1472698); Winzerling III.20 [tree no. 20] (F—573771).

CORNUTIA THYRSOIDEA Banks & Moldenke

Additional synonymy: Cornutia thyrsoidea Moldenke, in herb.

Additional bibliography: Moldenke, Phytologia 7: 399 (1961) and 14: 424. 1967.

Proctor describes this plant as a small bushy tree, 5 m. tall, with violet flowers in May, growing along roadsides at an altitude of 2300—2500 feet. It was previously misidentified and distributed in herbaria as C. jamaicensis Moldenke.

Additional & emended citations: JAMAICA: N. L. Britton 3766 (W—656325); W. Harris 5731 (F—145496), 6349 (F—145395), 11066 (W—699858); Proctor 19689 (N, W—2286942).

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ADDITIONAL NOTES ON THE GENUS CITHAREXYLUM. IV

Harold N. Moldenke

CITHAREXYLUM B. Juss.

Additional synonymy: Citharexyhum Bocq., Rev. Verbenac. 128, sphalm. 1863.

Additional & emended bibliography: Bocq., Adansonia 2: 85, 88, 89, 96, 105, 109, 117, 118, 123, 126—128, 130, 131, 135, 136, 141, 142, 145—147, 152, 154, 157, & 160 (1862) and 3: 180, 182—185, 194, 197, & 222—224, pl. 13. 1863; Bocq., Rev. Verbenac. 85,

88, 96, 105, 109, 117, 118, 123, 126--128, 130, 135, 136, 141, 142, 145--147, 152, 154, 157, 160, 178, 180, 182--185, 194, 197, & 222--224, pl. 13. 1863; A. S. Hitchc., Ann. Rep. Mo. Bot. Gard. 4: 117. 1893; Achart, Quinz. Cent. Pl. Ind. 145. 1905; C. K. Schneid., Illust. Handb. Laubholzk. 590. 1911; L. H. Bailey, Man. Cult. Pl., ed. 1, pr. 1, 628, 631, & 807 (1924) and pr. 2, 628, 631, & 807. 1925; Sandw., Kew Bull. Misc. Inf. 1930: 210--211 & 214. 1930; Sampaio, Bol. Mus. Nac. Rio Jan. 13: 267. 1937; Sandw., Kew Bull. Misc. Inf. 1938: 373. 1938; L. H. Bailey, Man. Cult. Pl., ed. 1, pr. 3, 628, 631, & 807 (1938) and pr. 4, 628, 631, & 807. 1944; Le Cointe, Amaz. Bras. III Arv. & Pl. Uteis, ed. 2, 376 & 499. 1947; Chittenden, Roy. Hort. Soc. Dict. Gard. 1: 493. 1951; Asprey & Robbins, Ecol. Monog. 23: 374, 382, 383, 400, & 411. 1953; Moldenke, Phytologia 5: 24 & 95 (1954) and 5: 405. 1956; Moldenke, Inform. Mold. Set 51 Spec. 2. 1956; Moldenke, Phytologia 5: 509. 1957; H. N., A. L., & A. R. Moldenke, 1957 Christ. Bless. [3]. 1957; Moldenke, Am. Midl. Nat. 59: 334--336. 1958; Moldenke, Phytologia 6: 448--505 & 509. 1959; J. Hutchinson, Fam. Flow. Pl., ed. 2, 2: 395. 1959; Anon., Kew Bull. Gen. Index 1929-1956, 76. 1959; Runner, Rep. G. W. Groff Coll. 362. 1961; Gupta & Marlange, Trav. Sect. Scient. Inst. Franç. Pond. 3 (1): 78--79 & 127. 1961; Srinivasan & Agarwal, Bull. Bot. Surv. India 5: 80. 1963; E. E. Lord, Shrubs & Trees Austral. Gard., rev. ed., 66. 1964; A. D. Hawkes, Guide Pl. Everglades Nat. Park 43, 46, & 47. 1965; Liogier, Rhodora 67: 350. 1965; Sen & Naskar, Bull. Bot. Surv. India 7: 40. 1965; Anon., Gen. Costa Ric. Phan. 10. 1966; Fournier, Imp. Tree Fam. Costa Ric. 13. 1966; Moldenke, Résumé Suppl. 14: 1, 2, & 8. 1966; A. María, Pl. Valle Cochabamb. 2: 41. 1966; Jiménez, Supl. Cat. Fl. Doming. 1: 210--212 & 273. 1966; J. Gómez, Biota 6: 103, 107, 114, & 119. 1966; Moldenke, Phytologia 13: 310, 327, 401, 508, & 509 (1966) and 14: 216. 1967.

Lord (1964) avers that the common name, fiddlewood, is taken from the French, fidele, referring to the "reliability" of the timber and therefore with NO reference to violins!

CITHAREXYLUM AFFINE D. Don

Additional bibliography: Moldenke, Inform. Mold. Set 51 Spec. 2. 1956; Moldenke, Phytologia 13: 278--279. 1966.

Additional citations: MEXICO: México: G. L. Fisher s.n. [Amecameca, July 26, 1924] (Ws).

CITHAREXYLUM AMAZONICUM Moldenke

Additional bibliography: Le Cointe, Amaz. Bras. III Arv. & Pl. Uteis, ed. 2, 376. 1947; Moldenke, Phytologia 13: 279--280. 1966.

Le Cointe (1947) records the vernacular names "pau-de-guitarra" and "pau-de-viola", and says of the wood "para marcenaria, caixoteira e fabricação de instrumentos de cordas."

CITHAREXYLUM ARGUTEDENTATUM Moldenke

Additional bibliography: Moldenke, Phytologia 13: 280 & 303.

1966.

CITHAREXYLUM BRACHYANTHUM (A. Gray) A. Gray
Additional bibliography: Moldenke, Phytologia 13: 310. 1966; Moldenke, Résumé Suppl. 14: 8. 1966.
Additional citations: MEXICO: San Luis Potosí: J. Rzedowski 7636 (Du—510645). Zacatecas: J. Rzedowski 9323 (Mi).

CITHAREXYLUM CAUDATUM L.
Additional bibliography: Asprey & Robbins, Ecol. Monog. 23: 400 & 411. 1953; Moldenke, Am. Midl. Nat. 59: 334. 1958; Moldenke, Phytologia 13: 282—284, 292, 293, 312, & 314. 1966.
Recent collectors in Jamaica describe this species there as a tall shrub, 10—12 feet tall, or a tree, 6.9—10 meters tall, with odoriferous flowers, and the fruit green, orange-brown at the apex [in July] or orange [in August], the calyx "green with orangish margins", common on brushy limestone hillsides or on wooded limestone hills, at altitudes of 2100—4000 feet. The flowers on Yuncker 17467 are described as "white" and on Crosby, Hespenheide, & Anderson 692 as "white tinged with orangish in bud" Ekman 13902 represents a very small-leaved form of the species and may be worthy of varietal rank, as suggested by O. E. Schulz. My son, Andrew R. Moldenke, found the species growing in a mangrove swamp in Panama.
Thorne 33366 was collected in a patch of mixed woods with Acacia koa, Metrosideros collina, Hibiscus arnottianus, Cordyline terminalis, Antidesmia platyphylla, etc., and is described as having been taken from "small introduced naturalized trees with white flowers". Its leaves are not at all typical of C. caudatum, being too sharply acute, and have much the aspect of C. donnell-smithii Greenm. These Hawaiian specimens should be re-studied.
The Webster & Wilson 5069, Webster & Proctor 5414, and Webster, Proctor, & Powell 5358, distributed as C. caudatum, seem to be xC. perkinsi Moldenke -- they have very large broad leaves that are somewhat rough-reticulate above. The very abundant fruit on the fruiting racemes, however, seems to cast doubt on the hybrid nature of this taxon. Perhaps it represents a natural variety, although its foliar characters seem to be intermediate.
The S. A. Graham 281, distributed as C. caudatum, is actually C. donnell-smithii Greenm.
Additional citations: PANAMA: Colón: A. R. Moldenke 1229 (Ac). CUBA: Havana: Baker & Abarca 4322 (W—1584512). Las Villas: Ekman 13902 (Mi). JAMAICA: Crosby, Hespenheide, & Anderson 692 (Mi); G. R. Proctor 26629 (Mi); Yuncker 17467 (Mi). POLYNESIA: HAWAIIAN ISLANDS: Oahu: R. F. Thorne 33366 (Mi).

CITHAREXYLUM DAWEI Moldenke
Additional bibliography: Moldenke, Phytologia 13: 284 & 316.

1966.

CITHAREXYLUM DECORUM Moldenke
Additional bibliography: Moldenke, Phytologia 13: 284—285, 290, & 302. 1966.

CITHAREXYLUM DISCOLOR Turcz.
Additional bibliography: Moldenke, Phytologia 13: 285. 1966; Jiménez, Supl. Cat. Fl. Doming. 1: 210. 1966.

CITHAREXYLUM DONNELL-SMITHII Greenm.
Additional bibliography: Moldenke, Phytologia 13: 285—286. 1966.

Recent collectors describe this plant as a slender shrub, 2 m. tall, or a tree, 20 m. tall, with fruits amber-colored or "en cadenas naranjadas, vistosas", growing on slopes with Quercus, in dry arroyo beds, on steep heavily wooded streambanks, and along cleared paths in mixed evergreen forests, flowering in October, fruiting in February and December, at 7000 feet altitude, and called "chorrito". The corollas are described as "white" on Allen & Armour 6798 and on Breedlove & Raven 13743, and as "pale-yellow" on S. S. White 5191.

Additional citations: MEXICO: Chiapas: Breedlove 7848 (Mi); Breedlove & Raven 13743 (Mi). GUATEMALA: Guatemala: S. S. White 5191 (Mi). EL SALVADOR: Santa Ana: Allen & Armour 6798 (Du—466537). PANAMA: Chiriquí: S. A. Graham 281 (Mi).

CITHAREXYLUM ELLIPTICUM Sessé & Moc.
Additional bibliography: Moldenke, Phytologia 13: 286. 1966.
Additional citations: MEXICO: Vera Cruz: Sauer & Gade 3082 (Ws).

CITHAREXYLUM FLABELLIFOLIUM S. Wats.
Additional synonymy: Citharoxylon flabellifolium S. Wats., in herb.

Additional bibliography: Moldenke, Phytologia 13: 310. 1966.

Recent collectors describe this plant as a shrub, 1—5 m. tall, with few flowers in February, fruiting in April, called "colorado", growing on hillsides, silty flats, and gentle slopes, as well as along roadsides, at 150 m. altitude. The flowers are described as "deep-lavender, the upper lobes darkest, whitish in throat, slightly deflexed" on Wiggins & Ernst 514, "purplish-lavender with white to yellowish throat" on I. L. Wiggins 15392, and "lavender, the margins of the lobes crinkly" on I. L. Wiggins 15329.

Additional citations: MEXICO: Baja California: D. M. Porter 402 (Du—451971); I. L. Wiggins 11499a (Du—321783), 15329 (Du—453242), 15392 (Du—453231); Wiggins & Ernst 514 (Du—507000). MONSERRATE ISLAND: R. V. Moran 3886 (Du—361515).

CITHAREXYLUM FLEXUOSUM (Ruíz & Pav.) D. Don

Additional bibliography: J. Gómez, Biota 6: 103, 107, 114, & 119. 1966; Moldenke, Phytologia 13: 286—287. 1966.

Gómez (1966) records the vernacular names "estrella" and "huacrampi" for this plant, and found it growing at 2400—3000 meters altitude in Ancash, Peru.

CITHAREXYLUM FRUTICOSUM L.

Additional synonymy: Citharexylum cinereum Alm. apud Anon., Kew Bull. Gen. Index 1929-1956, 76, sphalm. 1959.

Additional bibliography: Sandw., Kew Bull. Misc. Inf. 1930: 210—211. 1930; Sampaio, Bol. Mus. Nac. Rio Jan. 13: 267. 1937; Asprey & Robbins, Ecol. Monog. 23: 374, 382, 383, & 411. 1953; Moldenke, Am. Midl. Nat. 59: 334 & 335. 1958; Anon., Kew Bull. Gen. Index 1929-1956, 76. 1959; E. E. Lord, Shrubs & Trees Austral. Gard., rev. ed., 66. 1964; A. D. Hawkes, Guide Pl. Everglades Nat. Park 43, 46, & 47. 1965; Liogier, Rhodora 67: 350. 1965; Sen & Naskar, Bull. Bot. Surv. India 7: 40. 1965; Moldenke, Phytologia 13: 283, 287—290, & 314. 1966; Moldenke, Résumé Suppl. 14: 2 & 8. 1966; Jiménez, Supl. Cat. Fl. Doming. 1: 210 & 273. 1966.

Yuncker found this species growing on dry rocky slopes from 50 to 2500 feet altitude in Jamaica, and reports the common name "yellow fiddlewood". The Ekman 8638, distributed as C. fruticosum, is actually var. subvillosum Moldenke.

Sandwith (1930) says, in speaking of the genus Schlegelia: "It is interesting to note how this genus in the tribe Crescentieae of Bignoniaceae, which is certainly unlike its congeners, has a facies so strongly recalling that of the well-known Citharexylum in Verbenaceae that it has repeatedly provided a pitfall for botanists from the time of Linnaeus down to the present century. Thus the type specimens of Citharexylum cinereum L., 'parasiticum scandens' of the Plantae surinamenses p. 10, no. 78 in Amoen. Acad. viii. p. 258 (1775), are the common Schlegelia of the section Euschlegelia of the Guiana forests, which was originally described and figured by Aublet as Besleria violacea, and later described by Miquel as S. lilacina and S. elongata, the latter being considered conspecific with the former by subsequent writers such as Seemann, K. Schumann and Pulle. This was first reported by Seemann in a paper on the Crescentiaceae in Trans. Linn. Soc. xxiii. 15 (1862), in which he treated Miquel's Schlegelia as a section of the genus Tanaecium; it was quoted by K. Schumann in Martius' Flora Brasiliensis vol. viii. pars ii. p. 401 (1896-7); and the identification has more recently (1923) been verified by Mr. N. E. Brown, who matches the specimens exactly with Jenman 4318 from the Lower Demerara River, British Guiana. Fortunately no change of name is necessitated by this mistake of Linnaeus, since the name Citharexylum cinereum had already been applied to another species. This earlier Citharexylum cinereum L. of Sp. Pl.

ed. ii. 872 (1763), as can be seen from the description and the references to Patrick Browne, Plumier and Plukenet, is a true Citharexylum, conspecific with C. fruticosum L. of Systema Naturae ed. x. 1115 (1759); and C. cinereum L. (1763) is accordingly sunk in synonymy under C. fruticosum L. by O. E. Schulz in his conspectus of the West Indian species of Citharexylum in Urban, Symb. Antill. vi. 61 (1909)."

Lord (1964) places C. subserratum Sw., C. cinereum L., and C. pentandrum Vent. in synonymy here, as well as the C. quadrangulare of Grisebach. Sampaio (1937) records the vernacular name "pau de viola" for what he calls C. cinereum L. Wagner describes the plant as a tree, 25 feet tall, the bark gray-tan, and the leaves stiff, light-green, much lighter beneath, the petioles orange, and the petals white. The Kimber 524, 849, 1895, & 2035, R. J. Wagner 578, and Webster & Miller 9829, distributed as C. fruticosum, are all actually C. spinosum L.

Additional citations: JAMAICA: Yuncker 17842 (Mi), 18054 (Mi). PUERTO RICO: R. J. Wagner 616 (S).

CITHAREXYLUM FRUTICOSUM f. BAHAMENSE (Millsp.) Moldenke

Additional bibliography: Moldenke, Phytologia 13: 288--290. 1966; Moldenke, Résumé Suppl. 14: 2 & 8. 1966.

CITHAREXYLUM FRUTICOSUM var. BRITTONII Moldenke

Additional bibliography: Moldenke, Phytologia 13: 289-290 & 314. 1966.

CITHAREXYLUM FRUTICOSUM var. SMALLII Moldenke

Additional bibliography: Moldenke, Phytologia 13: 289 & 290. 1966.

CITHAREXYLUM FRUTICOSUM var. SUBSERRATUM (Sw.) Moldenke

Additional synonymy: Citharexylum subserratum Swelt. ex Gupta & Marlange, Trav. Sect. Scient. Inst. Franç. Pond. 3 (1): 78, sphalm. 1961.

Additional bibliography: Gupta & Marlange, Trav. Sect. Scient. Inst. Franç. Pond. 3 (1): 78—79 & 127. 1961; Sen & Naskar, Bull. Bot. Surv. India 7: 40. 1965; Moldenke, Phytologia 13: 290. 1966; Jiménez, Supl. Cat. Fl. Doming. 1: 210—211. 1966.

This plant is recorded from India by Gupta & Marlange (1961), while Sen & Naskar (1965) tell us that it exists in cultivation there, but I have seen no material of it from India, either wild or cultivated. They record the vernacular name "kittāraimaram" for it there.

CITHAREXYLUM FRUTICOSUM var. SUBVILLOSUM Moldenke

Additional synonymy: Citharexylum fruticosum var. pentadrum Duchass. ex Jiménez, Supl. Cat. Fl. Doming. 1: 211, sphalm. in syn. 1966.

Additional bibliography: Liogier, Rhodora 67: 350. 1965; Mol-

denke, Phytologia 13: 290. 1966; Jiménez, Supl. Cat. Fl. Doming. 1: 211. 1966.

Additional citations: CUBA: Oriente: Ekman 8638 (Mi).

CITHAREXYLUM FRUTICOSUM var. VILLOSUM (Jacq.) O. E. Schulz

Additional bibliography: Bocq., Adansonia 2: 96 & 118 (1862) and 3: 223, pl. 13. 1863; Bocq., Rev. Verbenac. 96, 118, & 223, pl. 13. 1863; A. S. Hitchc., Ann. Rep. Mo. Bot. Gard. 4: 117. 1893; Liogier, Rhodora 67: 350. 1965; Moldenke, Phytologia 13: 289 & 290. 1966.

Additional citations: CUBA: Oriente: Ekman 7732 (Mi).

CITHAREXYLUM HEXANGULARE Greenm.

Additional bibliography: Moldenke, Phytologia 13: 291--292 & 303. 1966.

McVaugh found this as an occasional tree along lumber roads on steep slopes in humid forests of Abies, Quercus and other deciduous trees, with Pinus dominant on the ridges and summits, at altitudes of 2000 to 2250 meters. The leaves on his no. 23162 are exceptionally large and broad, being 16 cm. long and 7.5 cm. wide.

Additional citations: MEXICO: Jalisco: R. McVaugh 23162 (Mi).

CITHAREXYLUM HIDALGENSE Moldenke

Additional bibliography: Moldenke, Phytologia 13: 292 & 301. 1966.

The corollas on Moore 2631 are described as "white or lavender".

Additional citations: MEXICO: Hidalgo: H. E. Moore Jr. 2631 (Ws); Pringle 8969 (Ws--isotype).

CITHAREXYLUM HINTONI Moldenke

Additional bibliography: Moldenke, Inform. Mold. Set 51 Spec. 2. 1956; Moldenke, Phytologia 13: 292. 1966.

CITHAREXYLUM HIRTELLUM Standl.

Additional bibliography: Moldenke, Phytologia 13: 310. 1966; Moldenke, Résumé Suppl. 14: 1. 1966.

xCITHAREXYLUM HYBRIDUM Moldenke

Additional bibliography: Moldenke, Am. Midl. Nat. 59: 335. 1958; Moldenke, Phytologia 13: 292--293. 1966.

CITHAREXYLUM ILICIFOLIUM H.B.K.

Additional & emended bibliography: Bocq., Adansonia 3: [Rev. Verbenac.] 223. 1863; L. H. Bailey, Man. Cult. Pl., ed. 1, pr. 1, 631 & 807 (1924), pr. 2, 631 & 807 (1925), pr. 3, 631 & 807 (1938), and pr. 4, 631 & 807. 1944; Chittenden, Roy. Hort. Soc. Dict. Gard. 1: 493. 1951; Moldenke, Phytologia 13: 293. 1966.

The M. Bang 1917, distributed as C. ilicifolium, is actually the type collection of C. punctatum Greenm.

BOOK REVIEWS

Alma L. Moldenke

"Essentials of Biological Chemistry", second edition, by James L. Fairley and Gordon L. Kilgour, xvii & 314 pp., illus. Reinhold Publishing Corporation, New York City, New York 10022. 1966. $9.00

This new and much-improved edition with major additions of material on protein synthesis, nucleic acid structure, molecular genetics and Michaelis-Menten kinetics updates accurately the earlier edition. The life span of texts in this field is very short because of such rapid research progress.

The presentation has achieved considerably more coherence than is found in many texts. Even though the explanations are as thorough as required for careful undergraduate biochemistry training, the language presentation is clearer than that in many other texts.

"Principles of Agronomy" by Lorentz C. Pearson, xv & 434 pp., illus. Reinhold Publishing Corporation, New York City, New York 10022. 1967. $9.50

"Today the agronomist interested in weed control is dreaming of a chemical which can be applied at the same time the crop is seeded, one which will destroy all weeds and weed seeds without injuring the crop and then break down chemically to yield a fertilizer which will stimulate the crop. Possibly success in the realization of this dream will be gained by someone now beginning his college career who is not yet sure that he is interested in agronomy". This text is challengingly and carefully developed by stressing principles and reasons rather than minutia, therefore it is superior to most of the books in the field.

Considering the fact that biology, modernized by the green, blue and yellow versions of the BSCS courses, has become an almost universal 10th year subject today, this author may well have developed in depth more of the genetics and plant physiology effecting agronomy.

The text reads well despite a couple of split infinitives as on p. 12. The questions at the ends of the chapters are just routine content ones. A helpful glossary and index are given.

Among the earliest plants cultivated are included walnuts, raspberries and blackberries that were more likely just gathered crops from plants growing naturally near man's habitations.

The text contents are arranged as follows:

I. Introduction

II. Basic Principles of Crop Production: rotation - seed - water - soils - weed and other pest control - harvesting - agronomic research - genetics - plant breeding

III. Field Crops: grains - forage - fibers - sugars - roots - timbers - drugs - tobacco - hops - etc.

"Fantastic Trees" by Edwin A. Menninger, xii & 304 pp., illus. Viking Press, New York City, New York 10022 and Macmillan Company of Canada, Ltd. 1967. $8.95

The author's years of training and success in journalism provide zest and clarity to his writing style; his years of engrossing study of the flowering trees of the world make possible this fantastically interesting text and fantastically attractive illustrations about these fantastic marvels and monstrosities of the arboreal world.

The bizarre is related with scientific accuracy, with correct taxonomic determinations, and with ample evidence that the author is thoroughly familiar with the botanical studies of the outstanding leaders in the field. The name Avicennia nitida was changed to A. germinans at about the time that this book went to press. How can one put down unfinished a book with headings as: stripteasers, flowers and fruits underground, fruits on the wrong tree, obesity among trees, ant trees, gigantism, sex switchers, etc.?

If a reader "sniffs" anthropomorphism, it is only because his approach is too shallow; the book is about the extremes of adaptation for survival that confront all organisms whether they are the author's beloved trees or his famous brothers' human patients. Charming, thoughtful letters to the recently deceased Will and to Karl serve as explanatory prologue and epilogue to the text.

The chapter-starting Bible verses were of especial interest to us. We cannot agree with the author in his claim on p. 164 that the "mustard" of the Bible was Salvadora persica. It is indeed a mustard-flavored plant of the area, but its small drupes could not be the minute "grain of mustard seed" which we believe belonged to the ordinary Brassica nigra.

The printing and photography are fine. Only "usable" slipped through misspelled on p. 136. The bibliography and notes are invaluable.

"Plant Physiology" by Robert M. Devlin, xi & 564 pp., illus. Reinhold Publishing Corporation, New York City, New York 10022. 1966. $11.00

Here is a fine, flexible, new text with clear explanations and illustrations all so arranged that an instructor could profit by using it for either a semester or a year course, and with almost any arrangement of the topics to suit his plan.

The author's preface mentions the eight sections into which the book is divided, but the list of contents and the text itself give only seven: (1) introduction to the plant cell structurally and functionally, (2) such water relations as diffusion, osmosis, imbibition, transpiration, absorption and translocation, (3) carbohydrate metabolism involving enzymes, classification, fermenta-

tion, respiration and sugar translocation, (4) photosynthesis with its apparatus, pigments, light/dark reactions and rates, (5) mineral nutrition, function, translocation, nitrogen metabolism with protein synthesis, (6) plant growth hormones both natural and synthetic, and (7) growth and development as effected by photoperiodism, vernalization and dormancy.

Often there are succinct summaries at the end of topics. Good bibliographic material is provided at the end of each chapter. The index is skimpy.

"Biological Control of Insect Pests and Weeds", edited by Paul De Bach, xxiv & 844 pp., illus. Reinhold Publishing Corporation, New York City, New York 10022; published 1964, reprinted 1965. $22.50

This book is a crammed compendium of important, well illustrated information written by leaders in each field. Section 1 discusses the scope, importance and development of biological control principles and methods; Section 2 stresses fundamentals of population ecology and natural control; Section 3 deals with systematics; Section 4 surveys the importation and establishment of new natural enemies; Section 5 explains the conservation and augmentation of natural enemies; Section 6 describes all types of insect pathology; Section 7 deals with the biological control of weeds; and Section 8 summarizes all this work with "successes, trends and future possibilities". There are over 2500 literature references dating only partly through 1961 in the bibliography; all are fully indexed.

This thorough book is dedicated to the memory of one who initiated much of the work and was the mentor for most of the section authors. Royalties from this book go to the Harry S. Smith Memorial Fund of the University of California to help students and to promote progress in biological control. What a wonderful tribute!

The binding on this review copy is already broken.

"Phylogeny and Form in the Plant Kingdom" by Howard J. Dittmer, xiii & 642 pp., illus. D. Van Nostrand Company, Princeton, New Jersey 10639. 1964. $11.25

The author's preface describes his book as "a survey of the plant kingdom with descriptions of the structure, reproductive processes and phylogenetic relationships of the principal plant groups," tracing "the general pattern of evolution that extant groups seem to have followed."

This is a thorough survey of plant morphology, finely illustrated, documented with a few references at the end of chapters, clarified by an excellent glossary, helped with a good index, and marred by uninspiring "home-work" questions after each chapter. The approach is holistic, with minor references to DNA-RNA and sex in bacteria notwithstanding. There is much valuable material in this book, but its approach is "dated".

SIV 0003164

THREE NEW SPECIES OF OURATEA (OCHNACEAE) FROM PANAMA

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In preparing a treatment of the family Ochnaceae for a forthcoming issue of the Flora of Panama I encountered three new species of Ouratea.

1. OURATEA COCLEENSIS Dwyer, sp. nov.

Arbores ad 10 m altae, ramulis teretibus laevibus glabris. Folia petiolis ad 0.8 cm longis, oblongo-rotunda, ad 11 cm longa, ad 4.5 cm lata (lamina foliorum angustorum ad apicem cuneate disposita), basi rotunda vel obtusa, lamina tenui-coriacea laeve nitente glabra, costa supra plana, subtus prominente, venis lateralibus ca 15, prominulis sed non evanescentibus late arcuatis, venis intermediis paucis irregularibus, marginibus vel regularibus vel vix repandis, dentibus minutis, ca 3-5 mm distantibus; stipulae saepe persistentes amplexicaules vel divergentes, rectangulares, ad 1 cm longae, ad apicem angusto-cuneatae. Inflorescentiae hic pyramido-paniculatae axillares, ad 12 cm longae, ad 11 cm latae, ramis paucis patulis plano-compressis leviter tortis, infimis ad 6 cm longis, floribus solitariis vel geminatis in brevissimis ramis dispositis, locis articulationis ca 1.5 mm longis, pedicellis rectis crassis lignosis, ca 1 cm longis, ca 1 cm longis, gradatim ad perianthum amplificatis. Flores gemmis ovatis ad ovato-rotundis, ad apicem acutis; petala ca 8 mm longa. Fructus non visi.

PANAMA: Coclé: Cerro Pajita, N of El Valle de Antón, 3500 ft alt, Allen 449 (MO, holotype).

The new species resembles O. insulae Riley from which it differs in having a much more reduced panicle and leaves with the margins of the blades more or less uniform

2. OURATEA FLEXIPEDICELLATA Dwyer, sp. nov.

Suffrutices (?), ramulis teretibus laevibus. Folia petiolis ad 0.8 cm longis, crassis ascendentibus bene distantibus, lamina angusto-oblonga, ad 25 cm longa, ad 6.5 cm lata, ad apicem gradatim cuneata ultime acuminata, acumine ad 1.2 cm longo, basi obtusa, tenui-coriacea nitente glabra, costa supra prominula, subtus subprominente, venis lateralibus ca 10,

supra tenuibus vix prominulis, subtus conspicuis forte arcuatis, venis intermediis supra evanescentibus, subtus subconspicuis, aliquibus prime leviter arcuatis, tunc ad marginem evanescentibus, marginibus vix crassis repandis, dentibus 4-7 mm distantibus, eis in parte tertia superiore divergentibus, ad 1 mm longis. Inflorescentiae axillares vel terminales, anguste racemiformi-paniculatae, rhachidibus 8-30 cm longis, prime teretibus deinde ad apicem flexuosis, ramis arcuato-ascendentibus, brevibus, vix ad 1 cm longis, floribus 3-5 per bostrycem, bostrycibus inferioribus 0.5-2 cm distantibus. Flores pedicellis breviter articulatis ad 2 mm, filiformibus, in medio ca 0.75 mm latis, minute puberulis forte reflexis. Fructus (hic immaturi) receptaculo oblongo, ad 8 mm longo, drupis elliptico-rotundis, ca 4 mm longis.

PANAMA: Darien: forest near Pidiaque, 800-1000 ft alt, Duke 8050 (MO, holotype)

The new species is readily distinguished by its slender and obviously reflexed pedicels. It appears to be closely related to O. patelliformis Dwyer, described below as a new species, but differs in having a more rounded receptacle in the fruit.

3. OURATEA PATELLIFORMIS Dwyer, sp. nov.

Arbores ad 6 m, ramulis teretibus laevibus glabris. Folia bene distantia, petiolis ad 0.8 cm longis, vix crassis, lamina angusto-elliptica, 15-20 cm longa, 5-7 cm lata, ad apicem cuneata, acuminata deinde ultime acuta, basi obtusa vel subcuneata, tenui-coriacea nitente laeve glabra, costa supra prominula, ad petiolum saepe plana, subtus leviter prominente, venis lateralibus ca 20, vix evanescentibus lato-arcuatis, eis basalibus plerumque argute ascendentibus, marginibus distaliter biserratis (vel marginibus saepe in toto biserratis), dente longiore divergente. Inflorescentiae axillares vel terminales, angusto-racemiformi-paniculatae, 11-18 cm longae, rhachidibus gracilibus rubescentibus, ca 2 mm latis, tortis et plano-compressis, ramis paucis, 0.4-4.5 cm longis, bostrycibus solitariis vel geminatis, eis infra medium orientibus 3-5 flores ferentibus, locis articulationis ad 0.3 cm longis, pedicellis ca 7 mm longis. Flores non visi. Fructus receptaculo patelliforme, ca 4 mm longo, 6-10 mm lato, cicatricibus druparum circularibus, ca 2 mm latis, forte depressis.

PANAMA: Panama: Pacora, Allen 3445 (MO, holotype).

The saucer-shaped receptacle of the new species is unique for the Central American species of Ouratea.

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NOTES ON NEOTROPICAL EUPHORBIACEAE

1. Synopsis of South American Sapium

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This is the first attempt to present a dichotomous key for this difficult genus. The great variability of characters, very few with diagnostic value, has for a long time resisted all attempts to put this genus in order.

Müller of Argau in 1863-1875 fighting these difficulties ended up with a confused tri-nominal labyrinth.

W. Botting Hemsley in 1900-1909 presented a series of 35 drawings in Hooker's Icones. The analytical details are accurate and the drawings beautiful, but the nervature and margin of leaves are often misrepresented and are apparently the product of the draftsman's imagination.

Jacques Huber's work in 1906-1912 was no doubt the best work ever done on this genus. Adhering to a clear binominal approach and treating the genus by separate geographic districts he succeeded in achieving much clarification. It is unfortunate that he was unable to finish the Hylaea, the most important of all areas.

Pax and Hoffmann in 1912-1924 with their usual thoroughness compiled all the knowledge available up to that time but did little to treat the material critically.

Lanjouw in 1931 made very significant progress in clarifying the taxonomy of S. klotzschianum and related species.

Croizat in 1943-5 described a number of new species from Colombia and Venezuela presenting them in brillant discussions and giving valuable critical observations, but as usual has carefully avoided to clarify their systematic positions.

The key presented in the following no doubt requires improvements. The 83 binominals so far published have been reduced to 58. Further improvements and reduction will be possible when more and better material will become available.

A. Subgenus Sapium. Inflorescentia spicata cymulifera

1. Styli persistentes. Petioli longi (2-4 cm). Sect. Emmenostylum
2. Lamina basi ariculata

3. Folia margine integerrima, 7-8 cm longa (Venez: D.F., Mérida)..... 1. stylare
3. Folia sat regulariter serrata, 15-18 cm longa (Colombia)..... 2. putumajense
2. Lamina basi non auriculata; venae 15-25-jugae. Folia 10-14 cm longa (Colombia)..... 3. verum
1. Styli non persistentes
4. Glandulae petiolares obsoletae vix visibiles. Petioli 2-4.5 cm longi (Hylaea occidentalis)
5. Glandulae petiolares infra medium petioli insertae. Folia 8-21 cm longa 4.5-8 cm lata, basi rotundata vel subcordata (West Hylaea)..... 4. marmieri
5. Glandulae petiolares apice petioli insertae. Folia basi cuneata (West Hylaea, Colombia).. 5. eglandulosum
4. Glandulae petiolares conspicuae (excepto S. haematospermo, foliis linearibus facile distincto)
6. Glandulae petiolares, sub laminam inflexae saepe occultae
7. Folia apice plana, elliptico lanceolata vel oblanceolata; venae pauci-jugae (6-12)
8. Folia minora (3.5-6 cm longa, 1.5-2 cm lata), obovata, bicoloria, subtus opaca, firme coriacea, margine leviter dentata, saepe revoluta; venae subtus distinctae sed non prominentes (Brazilia orientalis)..... 6. sellowianum
8. Folia majora (10-23 cm longa, 3-6 cm lata), membranacea vel chartacea, concoloria, viridia, longe acuminata, margine obsolete dentata plana; venae arcuato-adscendentes, 6-12 jugae (Guiana, Pará)..... 7. microdentatum
7. Folia apice cucullato-inflexa vel calloso-incrassata
9. Petioli elongati, plus quam 1/4 laminae longi (Rio de Janeiro)..... 8. longipes
9. Petioli breviusculi, non 1/4 laminae attingentes (Rio de Janeiro)..... 9. sublanceolatum
6. Glandulae petiolares, variae sed nunquam inflexae neque sub laminam occultae
10. Folia chartacea vel submembranacea concoloria, viridia; venae subtus non prominentes
11. Folia apice plana parva (6.5-9 cm longa, 3 cm lata); venae paucijugae (5-10) arcuato-adscendentes
12. Petioli breviusculi (0.5-0.9 cm). Folia basi cuneata (Pto. Ayacucho)..... 10. contortum
12. Petioli longi (1.5-2.3 cm)
13. Venae 5-7-jugae, subtus prominentes. Glandulae petiolares graciles, cylindricae (Br. Guiana)..... 11. paucinervium
13. Venae 7-10-jugae, haud prominentes. Glandulae petiolares minores, hemisphaericae. Folia 8-10 cm longa

14. Ovarium 2-loculare (Suriname)..... ..... 12. montanum
14. Ovarium 3-loculare. Folia ovato lanceolata (5.9 cm longa, 2-4 cm lata) (Br. Guiana)..... 13. jenmanii
11. Folia apice cucullato-inflexa
15. Folia minora, obovata vel oblanceolata, minus quam triplo longiora quam lata (7-10 cm longa, 3.5 cm lata) (Suriname, Delta, Bolivar)..... ..... 14. prunifolium
15. Folia majora, lanceolata (10-18 cm longa, 2.5-3 cm lata), quadruplo longiora quam lata, apicem basinque versus symmetrice angustata
16. Glandulae petiolares breviusculae (Fr. Guiana, Bolívar, R. Branco, Pará, Ceara).. ..... 15. lanceolatum
16. Glandulae petiolares patentes, longae (Pará)..... 16. patens
10. Folia coriacea, concoloria vel bicoloria in sicco brunnea, nec viridia
17. Folia lata non linearia (minus quam 8-plo longiora quam lata)
18. Folia margine integra vel tantum subserrulata
19. Folia apice plana, rariter subcucullata
20. Costae secundariae arcuato-adcendentes
21. Folia elliptica vel subrotundata (minus quam bis longiora quam lata)
22. Petioli breviusculi (Brazilia orientalis)..... 17. obovatum
22. Petioli longi (1-2 cm); venae arcuatae
23. Venae 8-10-jugae prominulae; glandulae petiolares conicae (Peru, Colombia).18. bogotense
23. Venae 5-6-jugae; glandulae petiolares subcylindricae (Peru) 19. pavonianum
21. Folia elongata (plus quam bis longiora quam lata)
24. Petioli longi (2-4 cm)
25. Glandulae petiolares ovoideae parvulae (cf. S. eglandulosum) (R. Negro, Bolívar, Guianas)..... 20. aubletianum
25. Glandulae petiolares cylindricae, distinctae; venae 20-22-jugae (Ecuador)..... 21. utile
24. Petioli breviusculi (0.1-0.3 cm). Folia lanceolata (8 cm longa, 3 cm lata); venae 15-jugae (Vichado, Colombia)..... ..... 22. myrmecophyllum

20. Costae secundariae laxae, graciles, patentes, saepius haud anastomasantes, dictyodromae, ultimae vix perspicuae
26. Petioli 2.5-4 cm longi; venae 20-jugae. Folia 14 cm longa, 5 cm lata (Putumayo, alt. 2200 m)..... 23. cuatrecasasii
26. Petioli 1-1.5 cm longi; venae 5-jugae. Folia 14 cm longa, 6 cm lata, lanceolata, utrinque acutata (Eucador).... 24. steyermarkii
19. Folia apice cucullato-inflexa (cf. S. ixiamasense)
27. Nervatura subtus prominula, densa; venae rectae vel arcuato-ascendentes
28. Petioli longiusculi (1.5-4 cm)
29. Capsula sessilis
30. Glandulae petiolares graciles divaricatae, rectae vel curvatae
31. Folia lata (latitudo plus quam dimidium longitudinis), 7.7-12 cm longa, 3-5.5 cm lata (cf. naiguatense)(Brazilia orientalis inter Pará et S. Cat.).... 25. klotzschianum
31. Folia angusta (latitudo minus quam dimidium longitudinis)
32. Venae multijugae (17-20)
33. Folia basi subrotundata (12-30 cm longa, 3.5-7 cm lata) (Guiana).. ..... 26. hippomane
33. Folia basi acuta vel anguste cuneata (6.5-14 cm longa, 3.2-4.5 cm lata) (Guiana).... .....27. hemsleyanum
32. Venae paucijugae (12-15). Folia basi cuneata
34. Folia majora (8-15 cm longa, 3.5 cm lata) (Peru, Amazonas: Bom Fim)..... 28. taburu
34. Folia minora (4.2-9 cm longa, 1.9-2.5 cm lata) (Venez: Biscaine, 1000 m)..... ..... 29. obtusilobum

30. Glandulae petiolares minores, hemisphaericae. Folia basi suprotundata, vel late cuneata
35. Folia supra opaca, metallice nitentia (Peru, Hylaea occid.)..... 30. aereum
35. Folia supra nitida (Peruv. Andes)..... 31. poeppigii
29. Capsula stipitata. Folia basi cuneata (9 cm longa, 5 cm lata). Venae 8-11-jugae (Venez: D.F., 50 m alt.)..... 32. naiguatense
28. Petioli breviusculi (0.2-1.2 cm). Lamina chartacea. Folia apice obscure cucullata (2-8 cm longa, 2-3.5 cm lata). Venae 12-15-jugae (Peru: Tarapoto)..... 33. peruvianum
27. Nervatura subtus obscura, laxa
36. Spiculi depauperati. Folia minora (3-6 cm longa, 1.6-2.0 cm lata). Petioli breviusculi (0.4-0.6 cm) (Venez: Valera)..34. paucistamineum
36. Spiculi elongati densi. Folia 9-18 cm longa, 3-4 cm lata, plerumque cucullata. Venae 12-15-jugae. Petioli longiusculi (1.3 cm) (Peru, Bolivia, Matto Grosso)..... 35. ixiamasense
18. Folia margine distincte serrata vel cremulata
37. Folia majora (plus quam 10 cm longa, ad 18 cm longa) lanceolata vel ovato elliptica (2-5 ter longiora quam lata)
38. Petioli breviusculi (0.8-1.0 cm longi). Nervatura dense parallela, subtus arcte prominula; venae multijugae (15-25-jugae) arcuato-adscendentes. Folia lato-elliptica (12.5 cm longa, 5.3 cm lata) margine argute serrata (Paraguay: Minas Geraes)..... 36. hasslerianum
38. Petioli longiusculi (1.0-3.5 cm longi). Nervatura laxa; venae 12-15-jugae subtus graciliores subimmersae
39. Folia ellitica, duplo-subtriplo longiora quam lata
40. Folia margine modice crenulata basi subrotundata, apice modice cucullata (Parana, Minas Geraes)..... ..... 37. paranaense
40. Folia margine argute dentata apice leviter cucullata vel plana basi cuneata (Ins. F. Noranha, Maturin, Cristobal ?)..... 38. sceleratum

39. Folia anguste lanceolata, acuminata, triplo-quadruplo longiora quam lata
41. Glandulae petiolares parvae. Folia margine modice cremulata (Colombia)..... 39. aucuparium
41. Glandulae petiolares graciles cylindricae, divaricatae (Pará: Santarem, Belem)..... 40. ciliatum
37. Folia minora (2.5-10.0 cm) apice plana (cf. triste)
42. Folia calloso-marginata, obtuse crenulata
43. Folia lanceolata, quadruplo longiora quam lata, 10 cm longa, 1-2 cm lata. Venae distinctae (Goyaz, Minas S. Paulo, Paraguay)..... 41. marginatum
43. Folia minora elliptico-lanceolata, bis longiora quam lata
44. Folia ovato-elliptica 4.5 cm longa, 2 cm lata (Paraguay).....
.....42. paraguarense
44. Folia anguste elliptica
45. Folia 5-7 cm longa (Bahia).....
..... 43. cicatricosum
45. Folia 2.5-3 cm longa cucullata (Goyaz, Piauhy).... 44. triste
42. Folia non calloso-marginata
46. Folia oblongo-lanceolata, basi cuneata, 2-3.5 cm lata, apice acuminata, margine argute serrata (Pernambuco)..... 45. argutum
46. Folia elliptico-lanceolata
47. Petioli breviusculi
48. Folia cremulata sed non argute serrata
49. Folia haud disticha
50. Folia reticulata, subtus pallida (Bahia, Pará)..
..... 46. pallidum
50. Folia non reticulata, concoloria
51. Columna stylaris brevis (Piauhy, Rio Grande del Sul, Uruguay).....
... 47. montevidense
51. Columna stylaris elongata (Sta. Catarina).
..... 48. muelleri
49. Folia, disticha, 2.8 cm longa, 1-2 cm lata (Uruguay)... 49. gibertii

48. Folia regulariter argute crenata. Venae paulo prominentes. Folia 6-10 cm longa, 2-3.5 cm lata (Venezuela)..... ..... 50. albomarginatum

47. Petioli longiusculi. Folia crenulata sed non argute crenata (Sta. Catarina, R. Gr.del Sul)..... ..... 51. submarginatum

17. Folia linearia, 8-20-plo longiora quam lata. Petioli brevissimi. Venae immersae

52. Ovarium 2-loculare

53. Folia 11-15 cm longa, 0.4-0.7 cm lata (Bolivia)..... 52. boliviamum

53. Folia 10-20 cm longa, 1.5-2.5 cm lata. Glandulae petiolares parvae, sed distinctae (Argentina, Paraguay, Corrientes, Piauhy) (The Piauhy type is 3-carpellate)..... 53. longifolium

52. Ovarium 3-loculare

54. Folia minus quam 6 cm longa, 0.5-0.7 cm lata (Peru)..... 54. stenophyllum

54. Folia magis quam 10 cm longa

55. Folia magis quam 1.8 cm lata (Tucuman)... ..... 55. saltense

55. Folia minus quam 1.7 cm lata

56. Folia 1.0-1.6 cm lata. Glandulae petiolares obscurae, saepe nullae (Argentina, Uruguay, Paraguay)..... ..... 56. haematospermum

56. Folia 0.2-0.6 cm lata (Paraguay)..... ..... 57. linearifolium

A. Subgemus Pseudo-senefeldera. Inflorescencia paniculata)Alto Orinoco)..... 58. yutajense

Plate 1

Distribution of Sapium in South America

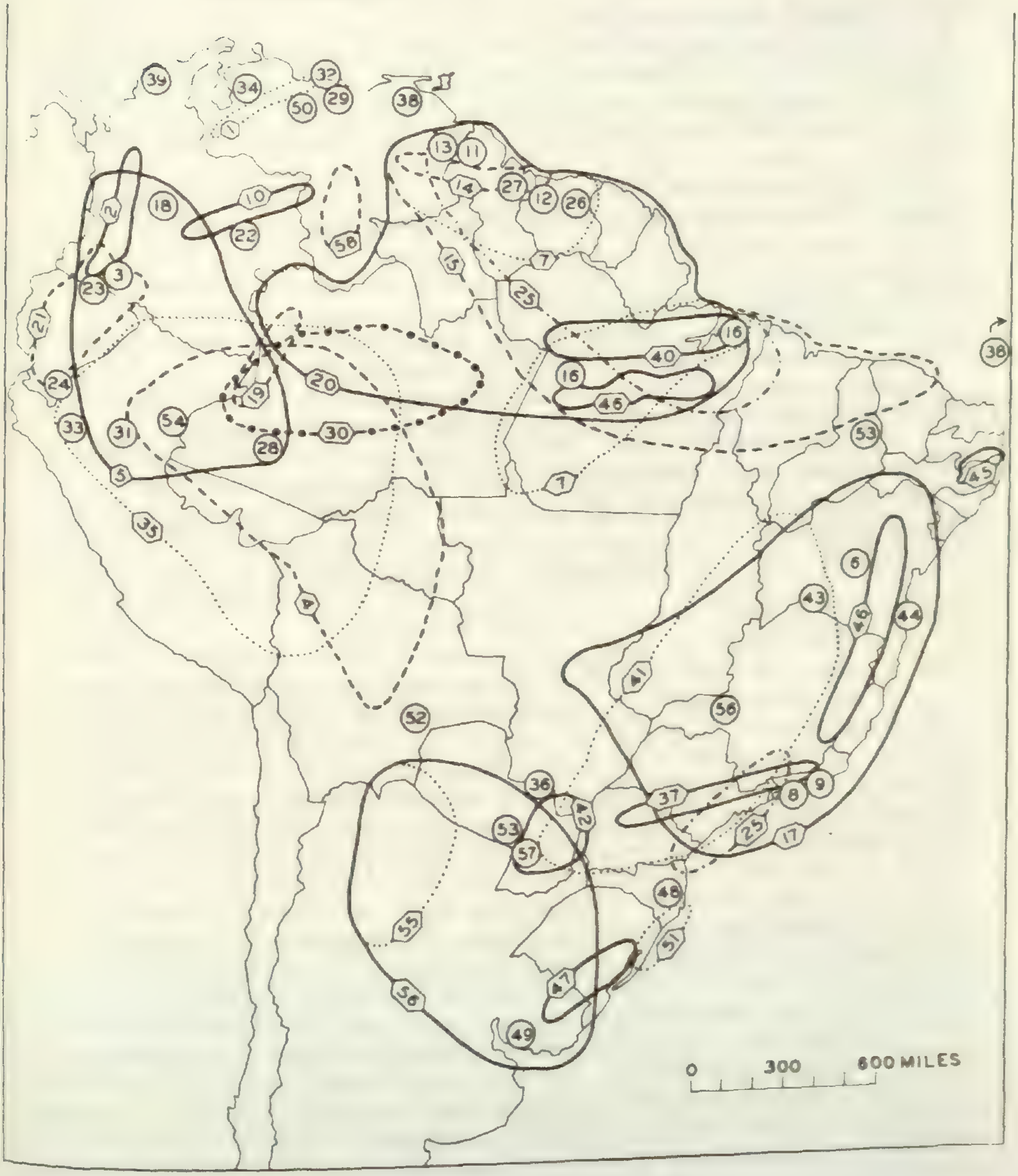
Figures in brackets indicate synonyms

aereum Kl. 30
albomarginatum Pax & H. 50
aubletianum Huber 20
aucuparium Jacq. 39
argutum Huber 45
bogotense Huber 18
bolivianum Pax & H. 52
cicatricosum Pax & H. 43
ciliatum Hemsl. 40
cladogyne Hutch. (13)
claussenianum Huber (25)
contortum Croiz. 10
cremostachyum Johnst. (25)
cutrecasassii Croiz. 23
cupuliferum Herzog (52)
decipiens Preuss (21)
diandrum Pax (25)
eglandulosum Ule 5
fragile Pax & H. (55)
gibertii Hemsl. 49
glandulatum Pax (25)
glandulosum Morong (53)
guaricense Pittier (50)
haematospermum Müll. Arg. 56
hamatum Pax & H. (31)
hasslerianum Huber 36
hemsleyanum Huber 27
hippomane E.P.Meyer 26
intercedens Huber (25)
ixiamasense sp. n. 35
jenmanii Hemsl. 13
klotzschianum Huber 25
lanceolatum Huber 15
leitera Gleason (4)
leptadenium Huber (25)
linearifolium Hemsl. 57
longifolium Huber 53
longipes Huber 8
marginatum Müll. Arg. 41
marmieri Huber 4
martii Huber (17)
microdentatum Lanj. 7
montanum Lanj. 12
montevidense Huber 47
muelleri Hemsl. 48
myrmecophilum Croiz. 22
naiguatense Pittier 32
obovatum Kl. 17
obtusilobum Müll. Arg. 29
occidentale Huber (17)
pallidum Huber 46
paranaense Pax & H. 37
patens sp. n. 16
paucinervium Hemsl. 11
paucistamineum Pittier 34
pavonianum Huber 19
peloto Pax & H. (4)
peruvianum stat. nov. 33
petiolare Huber (25)
poeppigii Hemsl. 31
pohlianum Kl. (25)
prunifolium Kl. 14
punctatum Kl. (41)
putumayense Croiz. 2
rojasii Levl. (56)
saltense stat. nov. 55
sceleratum Ridley 38
sellowianum Huber 6
serratum Müll. Arg. (47)
stenophyllum Huber 54
steyermarkii sp. n. 24
stylare Müll. Arg. 1
sublanceolatum Huber 9
submarginatum Huber 51
taburu Ule 28
tenellum Pax & H. (55)
thomsonii Jumelle (3)
tijucense Huber (47)
tolimense Jumelle (3)
triste Huber 44
utile Preuss 21
verum Hemsl. 3
yutajense sp. n. 58

Distribution of Sapium in South America.

Figures in circles indicate species with restricted distribution.

Figures in hexagons indicate species with broad distribution. Outline of areas approximate.



NOTES ON NEOTROPICAL EUPHORBIACEAE

2. New species and transfers

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SAPIUM PATENS Jabl. sp. nov.

Sapio lanceolato affine a quo glandulis petiolaribus gracilibus cylindricis divaricatis nec conicis, foliis basi subrotundatis apice anguste acuminatis minusque cucullatis differt.

Typus. Brasília: Pará, Rio Guama, San Miguel, Froes 20372 (NY)

Cetera specimina visa: Pará, Rio Guama, Irituia, Froes 20373 (NY); Rio Tapajos Urucuritiba, Archer 8432, 8436.

SAPIUM STEYERMARKII Jabl. sp. nov.

Ex affinitate S. ixiamasensis a qua venis 5-6 jugis subtus prominulis arcuato-adscendentibus optime recedit.

Folia late lanceolata margine indistincte repando-dentata; venae dictyodromae; glandulae peticlares subcylindricae.

Typus. Ecuador: Prov. Santiago-Zamora, densely forested moist slopes above and bordering Rio Tintas above Campanas campamento, southeast of El Pan, alt. 2860-2985 Julian A. Steyermark 53508.

SAPIUM IXIAMASENSE Jabl. sp. nov. (Plate II)

Ex affiritate S. lanceolati a qua foliis coriaceis bicoloribus superne nitidulis subtus opacis pallide-viridibus differt.

Arbor 30-100-pedalis, trunco 1-2 pedes diametiente. Petioli longiusculi (1.3-1.5 cm longi). Glandulae petiolares divaricatae conicae minus quam 1 mm altae. Folia 2 1/2- 3 1/2-plo longiora quam lata plerumque 7-12 cm longa rariter ad 18 cm longa 3-4 cm lata lanceolata apicem basinque versus symmetrice angustata rariter oblanceolata basi cuneata apice caudata imo apice incrassata distincte cucullata vel rariter vix cucullata rarissime plana margine integerrima superne nitidula subtus opaca pallide-flavo-viridula; costae secundariae 12-15-jugae superne fere prominentes subtus immersae vix visibiles. Spicae cymuligerae 7-10 cm longae in axillis foliorum superiorum orientes folia subaequantes apice flores paucos masculos ceterum femineos gerentes vel unisexuales masculae; rhachis sulcata; cymuli masculi 5-8-flores, feminei 1-2-flores; bracteae late triangulares subintegrae utrinque basi glandula elliptica auctae. Ovarium sessile; columna stylaris decidua. Capsula depresse-globulosa matura 7 mm diametiens sessilis; styli decidui. Semina subglobosa 3.1-3.4 mm diametientia atrobadia purpureo-arillata.

Typus. Bolivia: Ixiamas, alt. 1450 pedes, R. S. Williams 891 (NY) !

Specimina cetera visa:
Peru: Mouth of Rio Santiago Tessmann 4649 (NY) !
Brazil: Solimoes, Froes 5662 (NY) !
Falls of Madeira, Rusby 1239, 1238 (NY) !
Nota. Rusby 1238 forma foliis apice non cucullatis.

STILLINGIA ARGUTEDENTATA Jabl. sp. nov. (Plate III)

Certissime ex affinitate St. dichotomae Mull. Arg. a qua foliis multo profundius et distinctius serrato-dentatis, et basi glandulis minutis duabus ornatis optime differt.

Frutex 2 metralis ramulis carnosulis in siccitate quasi lignosis. Folia opposita vel ad apicem ramulorum congesta. Stipulae cito caducae non visae. Petiolus 3-8 mm longus. Lamina late elliptica, 7-10 cm longa, 3-4 cm lata basin et apicem versus angustata, imo apice mucronulata, paulo succulenta, margine argutissime serrulato-dentata, crenaturis angulo recto divaricatis vel irregulariter curvatis, basi superne glandulis geminis adpressis, 0.5-0.75 mm diametientibus orbiculari-scutelliformibus obsita. Costae venaeque indistinctae, secundariae angulo 3/4-recto insertae. Spicae terminales bisexuales 4-6 cm longae basi nudae dein fructus paucos gerentes, floribus ♀ ad anthesin ignotis, superne densius cymulis ♂ 2-3 floribus ornatae. Rhachis sicca 1-2 mm lata. Capsulae 5-6 mm longae pericarpii basi cocculis delapsis persistenti receptaculum 3-radiatum induratum "coccophorum" vel "gynobasin" dictum, nec columellam centralem formanti. Semina 2.5-3.0 mm longa subglobosa atro-badia, albocarunculata.

Specimina mucedinosa, ideo in siccitate valde conspurcata.

Typus: Minas Gerais: Margen da Rodovia Namuque-Teofilo Otoni. Serra rochosa. Arbusto de 2 m, flores amarelas, frutos verdes. 14 Aug 1965, Romeu P. Belem 1613, holotype (UB); 1616 paratype (UB).

SAPIUM YUTAJENSE Jabl. sp. nov.

In Memoirs NY Botanical Garden, in press.

SAPIUM PERUVIANUM (Macbride) Jabl. stat. nov.

Sapium martii var. peruvianum Macbride in Flora of Peru in Field Mus. Nat. Hist. Publ. Botany 13, 3a, 1: 195. 1951.

SAPIUM SALTENSE (O'Donell & Lourteig) Jabl. stat. nov.

Sapium haematospermum var. saltense O'Donell et Lourteig in Lilloa 8: 586. 1942.

SEBASTIANIA RHOMBIFOLIA (Rusby) Jabl. comb. nov.

Sapium rhombifolium Rusby in Bull. Torrey Bot. Club 28: 307. 1901. (Plate IV)

Corrected description and additions to original description:

Petioli 0.5-1.0 cm longi (nec 1-5 cm), eglandulosi. Lamina margine integerrima apice ipso longe-acuminate saepe mucronulata chartacea vel membranacea (nec coriacea) basi facie inferiori glandulis binis elongatis instructa. Fructus ignoti.

Typus. Bolivia: Falls of Madeira, Rusby 1824.

Plate II

Sapium ixiamasense Jabl. sp. n.

Fig. A. Habit 4/5
B. Leaf, nervature exaggerated 4/5
C. Cucullate tip of leaf 4/1
D. Male flower 15/1
E. Male part of inflorescence 6/1
F. Female flower 12/1

Plate III

Stillingia acutedentata Jabl. sp. n.

Fig. A. Habit 4/5
B. Male cymule 12/1
C. Male flower 12/1
D. Capsule 4/1
E. Gynobase 4/1

Plate IV

Sebastiania rhombifolia (Rusby) Jabl. comb. n.

Fig. A. Habit 4/5
B. Leaf, nervature exaggerated 4/5
C. Male cymule 24/1
D. Male cymule 24/1
E. Female flower 8/1

Plate II

CLARE

Plate III

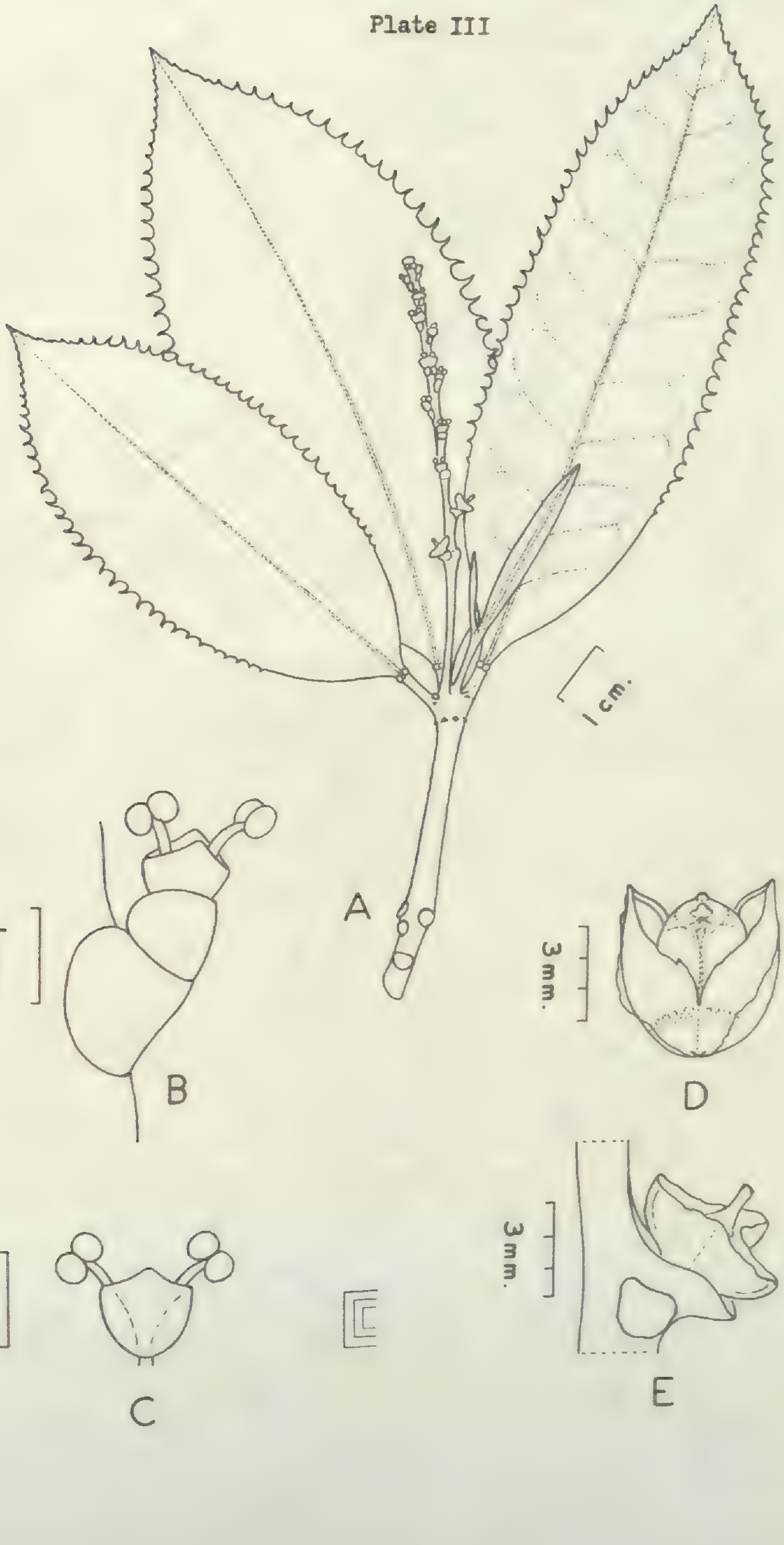

Plate IV

PHYTOLOGIA

Designed to expedite botanical publication

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NOTES ON BROMELIACEAE, XXV

Lyman B. Smith

It is over 30 years since Mez made a comprehensive survey of the genera of the Bromeliaceae in his second and final monograph of the family in the Pflanzenreich, and it is well to summarize the changes that have taken place in that time before attempting a new monograph. On the whole his system has stood up well, especially considering the material that was at his disposal. Not much further change is anticipated in the subfamilies Pitcairnioideae and Tillandsioideae, but thanks to the failure of Mez's pollen distinctions, there are many changes ahead in the Bromelioideae.

Any synonymy since the Pflanzenreich is noted under the appropriate genus.

BROMELIACEAE

1. Mature seed appendaged or if not (Pitcairnia in part and Navia) then the fruit at least partly capsular and dehiscent; ovary superior or largely so in most genera, to inferior; fruit capsular or if not (Pitcairnia in part) then the seed appendaged.
   2. Seed-appendages entire or slightly divided (Brocchinia paniculata) or lacking (Pitcairnia aphelandriflora and Navia); fruit usually dehiscent; leaves mostly spinose-serrate; indument of finely to scarcely divided scales; plants usually terrestrial.....I. PITCAIRNIOIDEAE
   2. Seed-appendages finely divided and forming a coma, always present; fruit dehiscent; leaves always entire; indument almost always of obvious scales; plants mostly epiphytic. II. TILLANDSIOIDEAE

1. Mature seed unappendaged; fruit baccate; ovary inferior or nearly so; leaves mostly spinose-serrate; indument almost always of obvious scales; plants often terrestrial. III. BROMELIOIDEAE

I. PITCAIRNIOIDEAE

1. Plants monoecious with perfect flowers or if rarely polygamo-dioecious (Dyckia maritima and D. selloa) then petals yellow or orange and plants native of southernmost Brazil and Uruguay.
2. Bases of the filaments separate from each other, but sometimes individually adnate to the petals and sepals.
   3. Seeds appendaged.
      4. Ovary wholly superior; petals regular.
         5. Petals naked.
            6. Seeds with a falciform or broad apical appendage.
               7. Petal-blades broad, distinct from claw, tightly coiled together after anthesis; Andean plants of open summits

from Costa Rica and Venezuela to Chile and Argentina. 1. PUYA

7. Petal-blades narrow, indistinct, remaining separate after anthesis; plants of northeastern Brazil. 2. ENCHOLIRIUM

6. Seeds bicaudate-appendaged.

8. Anthers basifixed, linear, coiled at anthesis; inner filaments adnate to base of petals; leaf-blades thin, more or less contracted at base; mesophytic plants of Mexico to Argentina.....3. FOSTERELLA

8. Anthers subbasifixed to equitant, stout, straight; filaments usually free; leaf-blades firm, not contracted at base; plants of the Guayana Highland and northeastern Brazil.

9. Anthers subbasifixed; petals brightly colored, more or less massed together together after anthesis but not twisted; sepals large and firm.....4. CONNELLIA

9. Anthers equitant; petals white, separate after anthesis; sepals not over 7 mm long, thin, flat. 5. COTTENDORFIA

5. Petals appendaged with a single basal scale each; plants of the southern Andes from Peru to Chile and Argentina.

10. Scape evident; inflorescence usually well developed; plants ring-forming so far as known...6. DEUTEROCOHNIA

10. Scape lacking; inflorescence one-few-flowered; plants polster-forming.....7. ABROMEITIELLA

4. Ovary partially to wholly inferior, or if superior then the petals zygomorphic (Pitcairnia mirabilis).

11. Petals large, naked or appendaged, usually zygomorphic and forming a hood over the anthers; sepals convolute with the left side of each overlapping the right of the next one; plants of Mexico and the West Indies to Argentina and Brazil.....8. PITCAIRNIA

11. Petals minute, regular; sepals cochlear with both posterior ones overlapping the anterior; plants of the Guayana Highland.....9. BROCCHINIA

3. Seeds naked at maturity.

12. Sepals convolute; petals zygomorphic (Pitcairnia aphelandriflora).....8. PITCAIRNIA

12. Sepals cochlear; petals regular, naked; ovary superior (in most species) to nearly inferior; plants of the Guayana Highland.....10. NAVIA

2. Bases of the filaments forming a tube and adnate to the petals; petals yellow or orange, cochlear; plants of eastern South America.....11. DYCKIA

1. Plants dioecious with functionally unisexual flowers; petals rose or white; plants of Texas, Mexico, and northern Central America.....12. HECHTIA

II. TILLANDSIOIDEAE

1. Ovary wholly or almost wholly superior; seeds plumose-appendaged only at base or apex, or mostly at base.

.2. Appendage of the seed wholly or preponderantly (Vriesea subgenus Alcantarea) basal, straight at maturity.
3. Petals free or with the very short tube much exceeded by the sepals.
4. Petals naked; inflorescence of one or more distichous-flowered spikes or rarely reduced to a single polystichous-flowered spike; largely xerophytic plants of southeastern United States to Chile and Argentina.
13. TILLANDSIA
4. Petals bearing scales on the inner surface; largely mesophytic plants of Mexico and the West Indies to Brazil and Argentina.....14. VRIESEA
3. Petals joined or closely agglutinated in a tube to the height of the sepals.
5. Petals naked; largely mesophytic plants of southern Florida and the West Indies and southern Mexico to Bolivia and Brazil.....15. GUZMANIA
5. Petals appendaged; plants of the central Andes.
16. MEZOBROMELIA
2. Appendage of the seed apical, folded over at maturity; sepals strongly asymmetric in most species; inflorescence of polystichous-flowered spikes; leaves mostly cretaceous-coated; plants of southern Florida, the West Indies, and Mexico to Brazil and Peru.....17. CATOPSIS
1. Ovary only half superior; seeds about equally plumose-appendaged at both ends; plants of the Lesser Antilles, Trinidad, and adjacent Venezuela.....18. GLOMEROPITCAIRNIA

III. BROMELIOIDEAE

1. Petals naked; inflorescence never simple and strobilate.
2. Filaments not forming a tube; petals free or connate by their margins.
3. Inflorescence elongate.
4. Inflorescence simple but lax and not strobilate.
5. Flowers pedicellate; sepals unarmed; plants of the Mount Itatiaia area in eastern Brazil.....19. FERNSEEA
5. Flowers sessile; sepals unarmed or mucronate; plants of Colombia.....20. RONNBERGIA
4. Inflorescence compound.
6. Stamens naked.
7. Ovules few; flowers minute, sessile or pedicellate; sepals not more than 3 mm long; plants of Costa Rica and Trinidad to Amazonian Brazil.....21. ARAEOCOCCUS
7. Ovules numerous; flowers larger, sessile; sepals 18-23 mm long; plants of eastern and Amazonian Brazil and adjacent areas.....22. STREPTOCALYX
6. Stamens appendaged; flowers sessile; plants of Central America.....23. ANDROLEPIS
3. Inflorescence densely capitate or capitiform or rarely spiciform with fascicles of flowers in the axils of ample bracts (Nidularium seidelii), often involucrate.

8. Flowers pedicellate.
 9. Stamens equaling or exceeding the rounded erect petal-blades; plants of Chile.....24. OCHAGAVIA
 9. Stamens shorter than the acute spreading petal-blades; plants of eastern Brazil to Amazonian South America. 25. NEOREGELIA

8. Flowers sessile.
 10. Epigynous tube very short or lacking.
  11. Outer bracts of the central inflorescence foliaceous; petals spreading, obtuse; usually some of the flowers unisexual; plants of eastern Brazil....26. CRYPTANTHUS
  11. Outer bracts of the inflorescence bracteiform; petals erect or if spreading (Nidularium in part) then acute.
   12. Outer bracts ample, colored, much exceeding the flowers; inflorescence always central; plants of eastern Brazil and Colombia.....27. NIDULARIUM
   12. Outer bracts small and inconspicuous; inflorescences mostly lateral in the axils of large cauline leaves; Andean plants from Mexico and Venezuela to Chile. 28. GREIGIA
  10. Epigynous tube elongate; scape elongate, slender; inflorescence not involucrate; plant of eastern Brazil. 29. ANDREA

2. Filaments forming a tube to which the fleshy petals are joined along their centers but with their margins free; plants of Mexico and the West Indies to Argentina and Uruguay.....30. BROMELIA

1. Petals appendaged or when rarely naked (Aechmea in part) then the inflorescence simple and strobilate.
 13. Ovaries always remaining distinct; inflorescence compound or simple.
  14. Ovary in small part superior; scape naked; inflorescence simple, strobilate, pseudolateral; plant of southeastern Brazil and adjacent areas.....31. ACANTHOSTACHYS
  14. Ovary completely inferior.
   15. Scape-bracts foliaceous or the scape lacking; sepals always free.
    16. Sepals nearly or quite symmetric; petal-appendages well developed.
     17. Filaments of second series adnate to the petals; scape usually present; plants of eastern Brazil. 32. ORTHOPHYTUM
     17. Filaments all free; scape lacking; plants of Chile. 33. FASCICULARIA
    16. Sepals definitely asymmetric; petal-appendages vestigial; plants of North and South America. 38. AECHMEA (in part)
   15. Scape-bracts distinct from the leaves, or if there is no evident scape (Aechmea in part) then the sepals much connate; epigynous tube often large.
    18. Inflorescence involucrate; sepals unarmed, nearly or quite free in most species; plants of eastern Brazil.

19. Petals completely free.....34. CANISTRUM
19. Petals partially connate above the base but often free at the base and exposing the bases of the filaments of the first series.....35. WITTROCKIA
18. Inflorescence not involucrate or if somewhat so then the sepals mucronate and much connate.
20. Inflorescence compound (simple in depauperate specimens of Hohenbergia littoralis); flowers in strobilate spikes, much compressed.
21. Epigynous tube very small or lacking; pollen-grains with 2 or 4 pores; plants of Central America and the West Indies to eastern Brazil.....36. HOHENBERGIA
21. Epigynous tube well developed; pollen-grains with more than 4 pores; plants of Costa Rica and the West Indies to northeastern Brazil.....37. GRAVISIA
20. Inflorescence simple or if compound then the flowers not in strobilate spikes.
22. Flowers sessile or if rarely pedicellate (Aechmea in part) then the sepals free.
23. Sepals mucronate or pungent or if blunt then small and the ovules long-caudate; plants of North and South America.....38. AECHMEA (in part)
23. Sepals unarmed or soft-apiculate; ovules unappendaged.
24. Ovules numerous.
25. Petals regular, erect or suberect; pollen-grains with pores; flowers sessile; plants of eastern Brazil.....39. QUESNELIA
25. Petals either zygomorphic or recurved in a spiral; dry pollen-grains usually with a single longitudinal fold; flowers sessile or pedicellate; plants of Central America to Argentina and Uruguay. 40. BILLBERGIA
24. Ovules few; flowers pedicellate, regular; plants of northeastern Brazil.....41. NEOGLAZIOVIA
22. Flowers pedicellate; sepals connate; pollen-grains with more than 4 pores; plants of eastern Brazil. 42. PORTEA
13. Ovaries fused with each other and with the fleshy bracts to form a syncarp; inflorescence usually with an apical coma, simple; sepals never mucronate.
26. Inflorescence with a small inconspicuous coma, never producing basal shoots; plant propagating by elongate rhizomes; petals bearing vertical folds; plants of Paraguay and adjacent areas.....43. PSEUDANANAS
26. Inflorescence usually with a large conspicuous coma, often with basal shoots; rhizomes lacking; petals usually bearing well developed scales; plants probably native from Paraguay to Amazonian Brazil, now pantropical..10. ANANAS

I. PITCAIRNIOIDEAE

1. PUYA Molina, Sagg. Chile 160, 351. 1782. Type: P.

chilensis Molina.

2. ENCHOLIRIUM Mart. ex Schult. f. in Roem. & Schult. Syst. 7, pt. 2: lxviii, 1233. 1830. Type: E. spectabile Mart.

3. FOSTERELLA L. B. Smith, Phytologia 7: 171. 1960. Type: F. micrantha (Lindl.) L. B. Smith (Pitcairnia micrantha Lindl.).

Lindmania Mez in DC. Mon. Phan. 9: 535. 1896, in large part but not as to type.

4. CONNELLIA N. E. Brown, Trans. Linn. Soc. ser. II, 6: 66. 1901. Type: C. augustae (Rich. Schomburgk) N. E. Brown (Encholirium augustae Rich. Schomburgk).

5. COTTENDORFIA Schult. f. in Roem. & Schult. Syst. 7, pt. 2: lxiv, 1193. 1830. Type: C. florida Schult. f.

Lindmania Mez in DC. Mon. Phan. 9: 535. 1896. Type: L. guianensis (Beer) Mez (Anoplophytum guianense Beer).

6. DEUTEROCOHNIA Mez in Mart. Fl. Bras. 3, pt. 3: 430, 506. 1894. Type: D. longipetala (Baker) Mez (Dyckia longipetala Baker).

7. ABROMEITIELLA Mez, Bot. Archiv. (Berlin) 19: 460. 1927. Type: A. pulvinata Mez.

8. PITCAIRNIA L'Hérit. Sert. Angl. 7. Jan. 1789 (nom. cons.). Type: P. bromeliaefolia L'Hérit.

Conanthes Raf. Fl. Tellur. 4: 24. 1838. Type: C. albiflos (herb.) Raf. (Pitcairnia albiflos Herb.).

Willrussellia A. Chevalier, Bull. Soc. Bot. France 84: 503. 1938. Type: W. feliciana A. Chevalier.

9. BROCCHINIA Schult. f. in Roem. & Schult. Syst. 7, pt. 2: lxx, 1250. 1830. Type: B. paniculata Schult. f.

10. NAVIA Schult. f. in Roem. & Schult. Syst. 7, pt. 2: lxv, 1195. 1830 (nom. cons. propos.). Type: N. caulescens Mart. ex Schult. f.

11. DYCKIA Schult. f. in Roem. & Schult. Syst. 7, pt. 2: lxv, 1194. 1830. Type: D. densiflora Schult. f.

Prionophyllum K. Koch, Ind. Sem. Hort. Berol. 1873, App.: 7. 1874. Type: P. selloum K. Koch. The distinction of flowers partially unisexual does not seem strong enough by itself for separation from Dyckia.

12. HECHTIA Kl. Allg. Gartenzeit. 3: 401. 1835. Type: H. stenopetala Kl.

Bakeria André, Rev. Hort. 61: 84, pl. 1889, non Seem. 1864. Type: B. tillandsioides André.

Bakerantha L. B. Smith, Contr. Gray Herb. 104: 72. 1934. Type: B. tillandsioides (André) L. B. Smith (Bakeria tillandsioides André).

II. TILLANDSIOIDEAE

13. TILLANDSIA L. Sp. Pl. 286. 1753; Gen. Pl. ed. 5. 138. 1754. Type: T. utriculata L.

14. VRIESEA Lindl. Bot. Reg. 29: 10. 7 Feb. 1843 ("Vriesia") corr. Beer, Bromel. 91. 1857 (orth. et nom. cons.). Type: V. psittacina (Hook.) Lindl. (Tillandsia psittacina Hook.).

Thecophyllum emend. sensu Mez, Bull. Herb. Boiss. ser. II, 3: 131. 1903, non André 1889.

Cipuropsis Ule, Verhandl. Bot. Ver. Brandenb. 48: 148. 1907. Type: C. subandina Ule.

15. GUZMANIA R. & P. Fl. Peruv. 3: 37, pl. 261. 1802. Type: G. tricolor R. & P.

Sodiroa André, Bull. Soc. Bot. France 24: 167. 1877. Type: S. graminifolia André.

Thecophyllum André, Bromel. Andr. 107. 1889. Type: T. poortmanii André. Cf. Smith & Pittendrigh, Journ. Washington Acad. Sci. 43: 401. 1953.

Chirripoa Suesseng. Bot. Jahrb. 72: 293, pl. 4, fig. 11. 1942. Type: C. solitaria Suesseng. Monotypic genus, a taxonomic synonym of Guzmania polycephala Mez & Wercklé.

16. MEZOBROMELIA L. B. Smith, Proc. Am. Acad. 70: 151, pl. 1, fig. 10, 11. 1935. Type: M. bicolor L. B. Smith.

17. CATOPSIS Griseb. Fl. Brit. W. Ind. 599. 1864. Type: C. nutans (Sw.) Griseb.. (Tillandsia nutans Sw.).

18. GLOMEROPITCAIRNIA Mez, Bull. Herb. Boiss. ser. II, 5: 232. 1905. Type: G. penduliflora (Griseb.) Mez (Tillandsia penduliflora Griseb.).

III. BROMELIOIDEAE

19. FERNSEEA Baker, Handb. Bromel. 19. 1889. Type: F. itatiaiae (Wawra) Baker (Bromelia itatiaiae Wawra).

20. RONNBERGIA E. Morr. & André, Ill. Hort. 21: 120, pl. 177. 1874. Type: R. morreniana Linden & André.

21. ARAEOCOCCUS Brongn. Ann. Sci. Nat. ser. II, 15: 370. 1841. Type: A. micranthus Brongn.

22. STREPTOCALYX Beer, Flora 37: 348. 1854. Type: S. poeppigii Beer.

23. ANDROLEPIS Brongn. ex Houllet, Rev. Hort. 42: 12. 1870. Type: A. skinneri Brongn. ex Houllet.

24. OCHAGAVIA Philippi, Anal. Univ. Chile 13: 168. May 1856; Bot. Zeitung 14: 647. Sept. 1856. Type: O. elegans Philippi.

Placseptalia Espinosa, Bol. Mus. Nac. Hist. Nat. Chile 23: 5. 1947. Type: P. rebecae Espinosa.

25. NEOREGELIA L. B. Smith, Contr. Gray Herb. 104: 78. 1934. Type: Billbergia meyendorffii Regel.

Regelia Lindm. Öfvers. Akad. Holm. 542. 1890, non Schauer 1843. Type: R. meyendorffii (Regel) Lindm. (Billbergia meyendorffii Regel).

Aregelia sensu Mez in DC. Mon. Phan. 9: 61. 1896, non Kuntze 1891. Kuntze's Aregelia was a renaming of Nidularium and therefore can not be applied to a segregate of it.

26. CRYPTANTHUS Otto & Dietr. Allg. Gartenzeit. 4: 297. 1836, non Osbeck 1757 (nom. cons.). Type: C. bromelioides Otto & Dietr

27. NIDULARIUM Lem. Jard. Fleur. 4: pl. 411, misc. 60. 1854. Type: N. fulgens Lem.

Aregelia Kuntze, Rev. Gen. 2: 698. 1891. Type: Nidularium fulgens Lem. An unnecessary renaming because of the supposed duplication of Nidularia Bull. in the fungi.

28. GREIGIA Regel, Gartenflora 14: 137, pl. 474. 1865. Type: G. sphacelata (R. & P.) Regel (Bromelia sphacelata R. & P.).

Hesperogreigia Skottsberg, Acta Horti Gotoburgensis 11: 220. 1936. Type: H. berteroi (Skottsberg) Skottsberg (Greigia berteroi Skottsberg).

29. ANDREA Mez in DC. Mon. Phan. 9: 114. 1896. Type: A. sellowiana (Baker) Mez (Quesnelia selloana Baker).

30. BROMELIA L. Sp. Pl. 285. 1753; Gen. Pl. ed. 5. 138. 1754. Type: B. pinguin L.

Deinacanthon Mez in DC. Mon. Phan. 9: 12. 1896. Type: D. urbanianum (Mez) Mez (Rhodostachys urbaniana Mez). The character of simple inflorescence by itself is not enough to distinguish Deinacanthon, especially as several species of Bromelia are very little branched.

31. ACANTHOSTACHYS Kl. in Lk., Kl. & Otto, Ic. Pl. Rar. Hort. Berol. 1: 21, pl. 9. 1840. Type: A. strobilacea (Schult. f.) Kl. (Hohenbergia strobilacea Schult. f.).

32. ORTHOPHYTUM Beer, Flora 37: 347. 1854. Type: O. glabrum (Mez) Mez (Prantleia glabra Mez). Beer indicated no species in his description of Orthophytum.

Sincoraea Ule, Bot. Jahrb. 42: 191. 1908. Type: S. amoena Ule.

Cryptanthopsis Ule, Bot. Jahrb. 42: 193. 1908. Type: C. saxicola Ule.

33. FASCICULARIA Mez in Mart. Fl. Bras. 3, pt. 3: 627. 1894. Type: F. bicolor (R. & P.) Mez (Bromelia bicolor R. & P.).

34. CANISTRUM E. Morr. Belg. Hort. 23: 257. 1873. Type: C. aurantiacum E. Morr.

35. WITTROCKIA Lindm. Svenska Vet. Akad. Handl. 24, no. 8: 20. 1891. Type: W. superba Lindm.

36. HOHENBERGIA Schult. f. in Roem. & Schult. Syst. 7, pt. 2: lxxi, 1251. 1830. Type: H. stellata Schult. f.

37. GRAVISIA Mez in Mart. Fl. Bras. 3, pt. 3: 179. 1891; 299. 1892. Type: G. exsudans (Lodd.) Mez (Bromelia exsudans Lodd.). It is becoming increasingly difficult to separate this genus from Aechmea.

38. AECHMEA R. & P. Prodr. 47. 1793. Type: Ae. paniculata R. & P.

Eriostax Raf. Fl. Tellur. 4: 25. 1838. Type: E. glauca Raf. nom. illeg. (Bromelia melanantha Ker-Gawl.).

Chevalieria Gaud. Atl. Voy. Bonite pl. 61. 1843. Type: C. sphaerocephala Gaud. Mez maintained this genus on the basis of naked petals, yet the original plate clearly shows them to be appendaged.

Disteganthus Lem. Fl. des Serres 3: pl. 227. 1847. Type: D. basi-lateralis Lem.

Wittmackia Mez in Mart. Fl. Bras. 3, pt. 3: 179, 274. 1 Nov. 1891. Type: W. lingulata (L.) Mez (Bromelia lingulata L.). Contrary to Mez's description, the petals are appendaged.

39. QUESNELIA Gaud. Atl. Voy. Bonite pl. 54. 1842. Type: Q. rufa Gaud.

40. BILLBERGIA Thunb. Pl. Bras. Dec. 30. 1821. Type: B. speciosa Thunb.

41. NEOGLAZIOVIA Mez in Mart. Fl. Bras. 3, pt. 3: 179. 1891.

Type: N. variegata (Arr. Cam.) Mez (Bromelia variegata Arr. Cam.).

42. PORTEA Brongn. ex K. Koch, Ind. Sem. Hort. Berol. 1856, App.: 7. 1857; Ann. Sci. Nat. ser. IV, 6: 368. 1857. Type: P. kermesiana Brongn. ex K. Koch.

43. PSEUDANANAS Hassler ex Harms in Engler & Prantl, Pflanzenfam. ed. 2, 15a: 153. 1930. Type: P. macrodontes (E. Morr.) Harms (Ananas macrodontes E. Morr.).

44. ANANAS Mill. Gard. Dict. abr. ed. 4. 1754. Type: Bromelia ananas L.

DOUBTFUL OR EXCLUDED

ANACYCLIA Hoffmannsegg, Preiss-Verzeichn. Pflanzen 1833: 10. 1833, in adnot. Type: A. farinosa Hoffmannsegg. Identity uncertain. Cf. Index Kew. Suppl. 12: 8. 1959.

PSEDOMELIA Neck. Elem. 3: 150. 1790. No type indicated. Cited by some as equivalent to Bromelia, but impossible because of the unilocular ovary. Possibly a member of the Zingiberaceae or Marantaceae.

WAETHAKYA Herm. Mus. Zeyl. 55. 1717. Based on Bromelia, foliis margine etc. L. Fl. Ceyl. 54. 1747, where cited. According to Mez in Engler, Pflanzenreich IV, 32: 636. 1935, this belongs to the Pandanaceae.

DYCKIA

The four largest genera in the subfamily Pitcairnioideae are Pitcairnia, Puya, Dyckia and Navia, in that order. All but Dyckia divide into fairly large groups of species so that it has been possible to revise them without too much perplexity and ambiguity. In Dyckia, however, only a handful can be separated with any facility and the remainder constitute a mass that appears to be the result of very recent and rapid evolution. The usual characters for separating bromeliad species break down in all directions and it is necessary to make a key that straddles interminably. The present key is a working key and much less stable than the others, but I am publishing it here to give other people a chance to use and improve it.

Previously, I tried to make a major division on whether the filaments were connate or not above the common tube with the petals. This was eminently logical, but unfortunately no more practical than any other character. In my disgust, I was going to discard the filament-fusion character completely, but at least it is no worse than the others, so I have decided to make what use I can of it.

Thus, the present key is a completely artificial one to serve the purpose of identification while I grope for something more significant.

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1. Pedicels 20-35 mm long, much exceeding the floral bracts; leaves over 1 m long, repand-serrate with teeth 4 mm long. Brazil: Minas Gerais.....1. D. pedicellata
1. Pedicels not over 15 mm long.
2. Inflorescence tripinnate or more divided; floral bracts not more than 3 mm long; sepals not more than 5 mm; some flowers unisexual (Prionophyllum).
3. Inflorescence densely tomentose-lepidote. Brazil: Santa Catarina, Rio Grande do Sul.....2. D. maritima
3. Inflorescence wholly glabrous. Uruguay. Brazil: Rio Grande do Sul.....3. D. selloa
2. Inflorescence not more than bipinnate or the floral bracts and sepals larger.
4. Stamens long-exserted (by more than the length of the anthers); inflorescence lax. Paraguay.
5. Pedicels 7-11 mm long; sepals 10-12 mm long; inflorescence lepidote.....4. D. insignis
5. Pedicels almost none; sepals 6 mm long; inflorescence glabrous.....5. D. exserta
4. Stamens not exserted by more than a fraction of the anthers.
6. Scape lacking; inflorescence sessile, 4 cm long. Brazil: Goiás.....6. D. odorata
6. Scape present or where not known, the inflorescence much more than 4 cm long.
7. Upper scape-bracts nearly equaling to exceeding the internodes (scape unknown in D. vestita and D. virgata). Subkey I
7. Upper scape-bracts much shorter than the internodes.
8. Inflorescence compound; pedicels not over 7 mm long. Subkey II
8. Inflorescence simple (or few-branched and probably simple at times).
9. Filaments free above the common tube with the petals. Subkey III
9. Filaments connate above the common tube with the petals. Subkey IV

Subkey I

1. Inflorescence compound.
2. Axes (at least) of the inflorescence densely lepidote or tomentose-lepidote.
3. Pedicels to 15 mm long; floral bracts exceeding the sepals. Brazil: Minas Gerais.....7. D. princeps
3. Pedicels not over 5 mm long; floral bracts serrulate.
4. Lowest floral bracts shorter than the flowers.
5. Margins of the sepals obscured by the dense lanate indument; petals barely exceeding the 15 mm long sepals. Brazil: Minas Gerais.....8. D. ursina
5. Margins of the sepals clearly visible.
6. Flowers subsessile; sepals 11 mm long, oblong-ovate, obtuse; indument of the inflorescence fulvous.

Paraguay.....9. D. vestita
6. Flowers on distinct pedicels 1-5 mm long; indument of inflorescence ferruginous.
7. Sepals strongly incurved at apex, acute, to 10 mm long. Brazil: Minas Gerais, Santa Catarina..10. D. monticola
7. Sepals straight or nearly so, 5-8 mm long.
8. Sepals at least twice as long as broad, acute, carinate. Brazil: Paraná.....11. D. frigida
8. Sepals less than twice as long as broad with a broad apex, ecarinate. Brazil: São Paulo to Rio Grande do Sul.....12. D. encholirioides
4. Lowest floral bracts equaling or exceeding the flowers; petals carinate.
9. Sepals 8 mm long; leaf-spines 3-5 mm long; inflorescence usually much branched. Brazil: São Paulo to Rio Grande do Sul.....12. D. encholirioides
9. Sepals 11-12 mm long, or the leaf-spines less than 2 mm long; inflorescence few-branched; petals scarcely if at all carinate. Brazil: Minas Gerais.
10. Inflorescence cinereous-lepidote; leaf-spines 2.5-3 mm long.....13. D. cinerea
10. Inflorescence ferruginous-lepidote; leaf-spines 1.5-2 mm long.
11. Filaments free above the common tube; style very short. 14. D. trichostachya
11. Filaments connate for 2 mm above the common tube; style 1/3 the length of the ovary.....15. D. bracteata
2. Axes of the inflorescence sparsely and fugaciously appressed-lepidote to glabrous.
12. Sepals acute, strongly incurved, 8-13 mm long. Brazil: Santa Catarina.....16. D. cabrerae
12. Sepals broadly rounded, straight or nearly so, 6-7 mm long.
13. Sepals elliptic, longer than wide. Brazil: Minas Gerais. 17. D. elata
13. Sepals deltoid-ovate, as wide as long. Brazil: Goiás. 18. D. goiana

1. Inflorescence simple.
14. Axes (at least) of the inflorescence densely lepidote or tomentose-lepidote.
15. Leaf-blades densely lepidote on both sides.
16. Floral bracts ample, covering most of the sepals; pedicels short and obscure; filaments free above the common tube.
17. Inflorescence villous; floral bracts entire. Brazil: Rio Grande do Sul.....19. D. choristaminea
17. Inflorescence lepidote; floral bracts serrulate. Brazil: Minas Gerais.....20. D. simulans
16. Floral bracts narrow; pedicels distinct; filaments connate above the common tube.
18. Leaves nearly 50 cm long, the blades 30 mm wide, laxly serrate; sepals 11 mm long. Brazil: Minas Gerais. 13. D. cinerea
18. Leaves 9-17 cm long, the blades 8-10 mm wide, repand-

serrate; sepals 6 mm long. Brazil: Paraná.
21. D. fosteriana

15. Leaf-blades soon glabrous above or on both sides.
19. Sepals triangular-acute or acuminate.
20. Inflorescence whitish-vestite.
21. Lower floral bracts apiculate; filaments free above the common tube. Uruguay. Southern Brazil.
22. D. remotiflora

21. Lower floral bracts acuminate; filaments connate above the common tube. Brazil: Minas Gerais to Santa Catarina.....23. D. minarum

20. Inflorescence ferruginous-vestite.
22. Floral bracts entire; sepals 15 mm long, their margins obscured by the dense lanate indument. Brazil: Minas Gerais.....8. D. ursina

22. Floral bracts serrulate; sepals 8-10 mm long.
23. Upper scape-bracts and lower floral bracts with a linear blade several times longer than the base; inflorescence very lax at base; sepals fimbriate. Brazil: Minas Gerais.....24. D. duarteana

23. Upper scape-bracts and floral bracts with narrowly triangular blades.
24. Floral bracts large, exceeding most of the flowers; pedicels 5 mm long, stout.
25. Posterior sepals alate-carinate; filaments free above the common tube. Brazil: Rio Grande do Sul.
25. D. irmgardiae

25. Posterior sepals carinate but not alate; filaments connate above the common tube. Brazil: Minas Gerais, Paraná, Santa Catarina.....26. D. reitzii

24. Floral bracts shorter than the flowers; pedicels to 10 mm long, slender. Brazil: Paraná.
27. D. hatschbachii

19. Sepals broadly rounded or subacute, obtuse or apiculate.
26. Lower floral bracts maximally 20-25 mm long, equaling or exceeding the flowers.
27. Filaments free above the common tube; leaf-blades sparsely appressed-lepidote beneath. Brazil: Goiás.
28. D. eminens

27. Filaments connate above the common tube; leaf-blades densely cinereous-lepidote beneath. Brazil: Minas Gerais.....15. D. bracteata

26. Lower floral bracts much less than 20 mm long or exceeded by the sepals or both.
28. Scape-bracts and lower floral bracts serrulate.
29. Leaves 5 cm long. Brazil: Minas Gerais.
29. D. densiflora

29. Leaves 30-100 cm long.
30. Floral bracts suborbicular; flowers erect or suberect; style very short. Brazil: Minas Gerais.
30. D. lagoensis

30. Floral bracts ovate or lanceolate; flowers spreading;

style 1/3 as long as the ovary. Brazil: São Paulo . to Rio Grande do Sul.....12. D. encholirioides

28. Scape-bracts and lower floral bracts entire or very obscurely serrulate.

31. Petals ferruginous-tomentulose; plant 1 m or higher; leaves repand-serrate with teeth 10 mm long; floral bracts shorter than the sepals. Brazil: Mato Grosso. 31. D. ferruginea

31. Petals glabrous; plant 3-5 dm high; leaf-spines to 3.5 mm long; lower floral bracts equaling or exceeding the sepals.

32. Filaments free above the common tube.

33. Sepals 8-12 mm long. Uruguay. Southern Brazil. 22. D. remotiflora

33. Sepals 6-7 mm long. Brazil: Goiás, Mato Grosso. 32. D. tenuis

32. Filaments connate above the common tube; sepals to 7 mm long. Brazil: Minas Gerais....33. D. schwackeana

14. Axes of the inflorescence glabrous or sparsely and fugaciously lepidote.

34. Leaf-blades very finely and regularly white-striate beneath due to the inclusion of the scales in the deep narrow internerves, broad and thick. Brazil: Minas Gerais to Santa Catarina.....34. D. brevifolia

34. Leaf-blades not regularly striate beneath, the scales more or less covering the nerves.

35. Scape-bracts all with linear blades; leaves entire or sub-entire; flowers 9 mm long, half as long as the inter-nodes. Brazil: Goiás, Mato Grosso (?). 35. D. burchellii

35. Scape-bracts diverse, the upper ones bladeless.

36. Sepals triangular-acute or acuminate, carinate.

37. Floral bracts ample, exceeding the lower flowers; inflo-rescence dense toward apex; pedicels stout, to 5 mm long; filaments connate.

38. Sepals alate-carinate, to 16 mm long; indument of in-florescence whitish. Brazil: Paraná...36. D. dusenii

38. Sepals not alate, 8-9 mm long; indument of inflores-cence ferruginous. Brazil: Minas Gerais, Paraná, Santa Catarina.....26. D. reitzii

37. Floral bracts narrow; inflorescence lax; sepals incurved

39. Scape-bracts and lower floral bracts serrulate; fila-ments connate for 2 mm above the common tube. Brazil Minas Gerais, Santa Catarina.....10. D. monticola

39. Scape-bracts and floral bracts entire or nearly so; filaments scarcely connate above the common tube. Brazil: Santa Catarina.....16. D. cabrerae

36. Sepals broadly rounded or subacute, obtuse or apiculate.

40. Scape-bracts and lower floral bracts serrulate.

41. Filaments connate above the common tube.

42. Floral bracts ample, the lowest exceeding the flowers, Brazil: Distrito Federal.....37. D. brasiliana

42. Floral bracts narrow, the lowest about equaling the sepals. Brazil: Rio de Janeiro to Paraná.
38. D. pseudococcinea

41. Filaments free above the common tube.
43. Leaves 7-8 cm long. Brazil: Minas Gerais.
20. D. simulans

43. Leaves 25-50 cm long.
44. Petal-blades ecarinate, suborbicular; lowest floral bracts equaling or exceeding the flowers. Brazil: Minas Gerais.....14. D. trichostachya

44. Petal-blades strongly carinate; lowest floral bracts about equaling the sepals. Brazil: Pará.
39. D. silvae

40. Scape-bracts and floral bracts entire or nearly so.
45. Lower floral bracts much shorter than the sepals; inflorescence laxly many-flowered; flowers subsessile; filaments high-connate. Paraguay.....40. D. virgata

45. Lower floral bracts equaling or exceeding the sepals.
46. Filaments connate above the common tube. Brazil: Minas Gerais.....33. D. schwackeana

46. Filaments free above the common tube.
47. Floral bracts broadly ovate and apiculate. Uruguay. Southern Brazil.....22. D. remotiflora

47. Floral bracts with a long narrowly triangular blade about as long as the base. Brazil: Goiás, Mato Grosso.....32. D. tenuis

Subkey II

1. Axes (at least) of the inflorescence densely lepidote or tomentose-lepidote.
2. Margins of the sepals obscured by the dense lanate indument; petals barely exceeding the 15 mm long sepals. Brazil: Minas Gerais.....8. D. ursina

2. Margins of the sepals clearly visible.
3. Indument of the inflorescence ferruginous. Brazil.
4. Sepals acute; floral bracts serrulate.
5. Sepals strongly incurved at apex, to 10 mm long. Brazil: Minas Gerais, Santa Catarina.....10. D. monticola

5. Sepals straight or nearly so, 5-8 mm long. Brazil: Paraná
11. D. frigida

4. Sepals broadly subacute or rounded, entire or apiculate.
6. Scape-bracts entire. Brazil: Minas Gerais.
41. D. weddelliana

6. Scape-bracts serrulate.
7. Floral bracts broadly ovate and apiculate, barely exceeding the lower pedicels. Brazil: Bahia.
42. D. maracasensis

7. Floral bracts narrower, acuminate, much exceeding the pedicels. Brazil: São Paulo to Rio Grande do Sul.
12. D. encholirioides

3. Indument of the inflorescence cinereous or fulvous.

Argentina, Paraguay. Southern Brazil.
8. Filaments free above the common tube with the petals.
9. Style about equaling the ovary. Paraguay. Argentina: Misiones. Brazil: Santa Catarina.....43. D. distachya
9. Style very short.
10. Floral bracts apiculate or obtuse; flowers lax; anthers included. Bolivia. Brazil: Mato Grosso. Paraguay. Argentina: Formosa, Chaco, Santa Fé.....44. D. ferox
10. Floral bracts acuminate; flowers dense; anthers somewhat exserted. Argentina: La Rioja, Jujuy, Tucumán. 45. D. velascana

8. Filaments connate above the common tube with the petals.
11. Sepals 11 mm long; style none; floral bracts acuminate, equaling the sepals. Paraguay.....9. D. vestita
11. Sepals 7 mm long; style trifid, 2.5 mm long; floral bracts apiculate, shorter than the sepals. Argentina: Salta.....46. D. chaguar

1. Axes of the inflorescence glabrous or laxly and fugaciously lepidote.
12..Sepals triangular-acute to acuminate; filaments free above the tube with the petals or nearly so. Brazil: Santa Catarina.....16. D. cabrerae
12. Sepals broadly acute to obtuse, entire or apiculate.
13. Filaments free above the common tube with the petals.
14. Floral bracts exceeding the flowers, acuminate. Paraguay. 47. D. velloziifolia

14. Floral bracts shorter than the sepals.
15. Floral bracts much exceeding the lower pedicels.
16. Style well developed, distinct, ca 2 mm long or more.
17. Branches densely flowered; sepals 3-6 mm long. Paraguay. Brazil: Parana, Mato Grosso..48. D. microcalyx
17. Branches laxly flowered; sepals 6-12 mm long.
18. Sepals even, more or less carinate, only about half as long as the petals. Southern Brazil. Paraguay. Bolivia.....49. D. leptostachya
18. Sepals distinctly nerved, not carinate, distinctly more than half as long as the petals.
19. Leaves very laxly serrate with nearly straight intervals. Brazil: Minas Gerais...50. D. mello-barretoi
19. Leaves sinuate-serrate. Brazil: Santa Catarina. 51. D. ibiramensis

16. Style short (not over 1 mm) or none.
20. Floral bracts acuminate; sepals carinate. Paraguay. 52. D. affinis

20. Floral bracts apiculate.
21. Rhachis geniculate, very slender; flowers more or less secund. Bolivia.....53. D. pulquinensis
21. Rhachis not more than flexuous; flowers not secund.
22. Anthers exserted. Argentina: Córdoba, San Luis, La Rioja.....54. D. floribunda
22. Anthers included.
23. Style lacking. Bolivia. Paraguay:. Brazil: Mato

Grosso. Argentina: Formosa, Chaco, Santa Fé. .
44. D. ferox

23. Style short, 1 mm, but distinct. Paraguay.
55. D. commixta

15. Floral bracts about equaling to shorter than the lower pedicels.
24. Petal-blades suborbicular; style almost none. Brazil: Minas Gerais.....56. D. orobanchoides
24. Petal-blades subrhombic-ovate; style 6 mm long, exserted. Paraguay.....57. D. tobatiensis

13. Filaments connate above the common tube with the petals.
25. Anthers included.
26. Pedicels to 5 mm long, mostly exceeding the floral bracts Brazil: Mato Grosso.....58. D. irwinii
26. Pedicels very short, much exceeded by the floral bracts. Brazil: Minas Gerais.....59. D. rariflora
25. Anthers exserted.
27. Style 2.5-5 mm long. Argentina: Misiones.
60. D. niederleinii
27. Style 1 mm long. Argentina: Santa Fé, Santiago del Estero.....61. D. ragonesei

Subkey III

1. Axis (at least) of the inflorescence densely lepidote or tomentose-lepidote.
2. Indument of the inflorescence ferruginous.
3. Margins of the sepals obscured by the dense lanate indument; petals barely exceeding the 15 mm long sepals. Brazil: Minas Gerais.....8. D. ursina
3. Margins of the sepals clearly visible.
4. Upper scape-bracts and lower floral bracts with a linear blade several times longer than the base; sepals fimbriate. Brazil: Minas Gerais.....24. D. duarteana
4. Upper scape-bracts with triangular blades.
5. Lower floral bracts and upper scape-bracts entire; petal-blades suborbicular, ecarinate. Brazil: Minas Gerais.
62. D. sordida
5. Lower floral bracts and upper scape-bracts serrulate; petal-blades elliptic to obovate, carinate. Brazil: São Paulo to Rio Grande do Sul.....12. D. encholirioides
2. Indument of the inflorescence cinereous or white.
6. Anthers exserted; style very short. Paraguay.
63. D. tomentella
6. Anthers included; style distinct.
7. Floral bracts ample, covering most of the sepals. Uruguay. Southern Brazil.....22. D. remotiflora
7. Floral bracts inconspicuous, exposing most or all of the sepals.
8. Upper scape-bracts and lower floral bracts serrulate. Brazil: Minas Gerais.....64. D. oligantha
8. Upper scape-bracts and lower floral bracts entire. Para-

guay. Argentina: Misiones. Brazil: Santa Catarina.
43. D. distachya

1. Axis of the inflorescence glabrous or sparsely and fugaciously vestite.
 9. Lower floral bracts rounded, subacute, obtuse or apiculate.
 10. Floral bracts from shorter than to slightly exceeding the 3-8 mm pedicels; sepals 7-8 mm long.
 11. Pedicels 8 mm long; petal-blades oblong, ecarinate. Brazil: Minas Gerais.....65. D. biflora
 11. Pedicels 3 mm long.
 12. Flowers subdense; petal-blades suborbicular. Brazil: Minas Gerais.....56. D. orobanchoides
 12. Flowers very lax; petal-blades rhombic. Brazil: Pará. 66. D. duckei
 10. Floral bracts much exceeding the pedicels.
 13. Style elongate, much more than 1 mm long.
 14. Floral bracts ample, covering most of the sepals. Southern Brazil. Paraguay. Argentina. Uruguay. 22. D. remotiflora
 14. Floral bracts inconspicuous, exposing nearly all of the sepals.
 15. Flowers dense; sepals 3-6 mm long. Paraguay. Brazil: Parana, Mato Grosso.....48. D. microcalyx
 15. Flowers lax; sepals 6-12 mm long.
 16. Sepals emarginate, lepidote-tomentellous. Northwestern Argentina.....67. D. tweediei
 16. Sepals obtuse, not emarginate, soon glabrous. Southern Brazil. Paraguay. Bolivia.....49. D. leptostachya
 13. Style short, not over 1 mm, or none.
 17. Rhachis geniculate, very slender; flowers more or less secund. Bolivia.....53. D. pulquinensis
 17. Rhachis not more than flexuous; flowers not secund.
 18. Anthers exserted.
 19. Petal-blades carinate. Argentina: Córdoba, San Luis, La Rioja.....54. D. floribunda
 19. Petal-blades ecarinate. Paraguay.....63. D. tomentella
 18. Anthers included.
 20. Style lacking. Paraguay. Argentina: Formosa, Chaco, Santa Fé.....44. D. ferox
 20. Style short, 1 mm, but distinct. Paraguay. 55. D. commixta

9. Lower floral bracts acuminate or linear-laminate.
 21. Pedicels to 14 mm long; leaves entire or subentire. Brazil: Minas Gerais.....68. D. heloisae
 21. Pedicels not over 7 mm long.
 22. Scape-bracts all with linear blades; leaves entire or subentire; flowers 9 mm long, half as long as the internodes. Brazil: Goiás, Mato Grosso (?). 35. D. burchellii
 22. Scape-bracts diverse, the upper ones bladeless.
 23. Style elongate, much more than 1 mm long.
 24. Floral bracts exceeding the flowers. Paraguay.

47. D. velloziiflora
24. Floral bracts shorter than the sepals.
25. Leaf-blades essentially the same on both sides. Brazil Minas Gerais.
26. Scales wholly covering the leaf-blades; scape-bracts serrulate.....69. D. argentea
26. Scales confined to the grooves between the nerves. 50. D. mello-barretoi
25. Leaf-blades more vestite beneath.
27. Scape-bracts serrulate. Brazil: Santa Catarina. 51. D. ibiramensis
27. Scape-bracts entire. Brazil: Minas Gerais.
28 Pedicels to 7 mm long.....70. D. linearifolia
28. Pedicels not more than 3 mm long....71. D. hilaireana
23. Style short, not over 1 mm long, or none.
29. Leaf-blades densely retrorse-serrate expecially toward the base. Brazil: Minas Gerais, Goiás. 72. D. marnier-lapostollei
29. Leaf-blades laxly serrate throughout.
30. Floral bracts about equaling the slender 5 mm long pedicels; flowers spreading or reflexed. Brazil: Minas Gerais.....73. D. macedoi
30. Floral bracts much exceeding the pedicels.
31. Anthers more or less exserted; floral bracts entire.
32. Lower floral bracts about equaling the flowers. Brazil: Goiás, Mato Grosso.....32. D. tenuis
32. Lower floral bracts shorter than the sepals.
33. Pedicels cylindric, 4 mm long. Brazil: Pará. 74. D. sickii
33. Pedicels broadly obconic, 2 mm long. Brazil: Goiás. 75. D. pumila
31. Anthers included.
34. Petals 17-18 mm long.
35. Petal-blades sharply curved-spreading. Brazil: Pará 39. D. silvae
35. Petal-blades suberect. Argentina: Misiones. 76. D. subinermis
34. Petals 9-15 mm long; petal-blades suberect.
36. Petal-blade strongly carinate.
37. Indument of the inflorescence stipitate-glandular in character. Brazil: Minas Gerais. 77. D. glandulosa
37. Indument of the inflorescence of peltate lacerate scales.
38. Lowest floral bracts exceeding at least the sepals; leaf-blades ferruginous-lepidote beneath Brazil: Paraná.....78. D. deltoidea
38. Lowest floral bracts shorter than the sepals.
39. Leaf-blades ferruginous-lepidote beneath; plants to 1 m high. Paraguay.....52. D. affinis
39. Leaf-blades whitish-lepidote beneath; plants 15-40 cm high. Brazil: Minas Gerais to Santa

Catarina.....79. D. tuberosa
36. Petal-blade very weakly if at all carinate; petals 10-11 mm long.
40. Pedicels to 4 mm long; petals brown, fleshy. Brazil: Goiás.....80. D. machrisiana
40. Pedicels not over 2 mm long. Brazil: Bahia. 81. D. elongata

Subkey IV

1. Axis (at least) of the inflorescence densely lepidote or tomentose-lepidote.
2. Lower floral bracts acuminate or linear-laminate.
3. Pedicels to 10 mm long; indument of the inflorescence ferruginous. Brazil: Minas Gerais.
4. Lower floral bracts with long linear blades. 24. D. duarteana
4. Lower floral bracts triangular-acuminate...82. D. macropoda
3. Pedicels not over 5 mm long.
5. Lower floral bracts serrulate.
6. Leaf-blades conspicuously repand-serrate, covered on both sides with cinereous scales. Brazil: Paraná. 21. D. fosteriana
6. Leaf-blades not repand-serrate, soon glabrous above; indument of the inflorescence ferruginous.
7. Sepals strongly incurved at apex, acute, to 10 mm long. Brazil: Minas Gerais, Santa Catarina...10. D. monticola
7. Sepals straight or nearly so, to 8 mm long.
8. Leaves 5 cm long; style very short. Brazil: Minas Gerais.....29. D. densiflora
8. Leaves 30-100 cm long; style 1/3 the length of the ovary. Brazil: São Paulo to Rio Grande do Sul. 12. D. encholirioides
5. Lower floral bracts entire or microscopically serrulate or fimbriate (D. saxatilis).
9. Style 1/3 to 1/2 the length of the ovary; pedicels distinct, 3-4 mm long.
10. Inflorescence very lax; sepals broadly acute and apiculate. Brazil: Piauí, Bahia, Minas Gerais. 83. D. dissitiflora
10. Inflorescence subdense; sepals obtuse. Brazil: Minas Gerais.....41. D. weddelliana
9. Style short, not over 1 mm, or none.
11. Flowers distinctly pedicellate; lower floral bracts equaling or exceeding the sepals; sepals obtuse. Brazil: Minas Gerais, Mato Grosso.....84. D. saxatilis
11. Flowers subsessile.
12. Indument of the inflorescence ferruginous; flowers 13 mm long. Brazil: Goiás.....85. D. uleana
12. Indument of the inflorescence fulvous; flowers to 20 mm long. Paraguay.....9. D. vestita
2. Lower floral bracts obtuse or apiculate.

13. Anthers included; indument of the inflorescence ferruginous; style 1.5 mm long. Brazil: Bahia. 42. D. maracasensis

13. Anthers exserted.
14. Style 6 mm long. Argentina: Misiones.....86. D. mitis
14. Style 1 mm long. Argentina: Santa Fé, Santiago del Estero 61. D. ragonesei

1. Axis of the inflorescence glabrous or sparsely and fugaciously lepidote.
15. Petals without a distinct claw and blade, narrowly elliptic; leaf-blades erect, 13-32 cm long, the spines nearly straight, 2 mm long; filaments wholly connate; stigmas subsessile. Brazil: Goiás, Mato Grosso...87. D. horridula
15. Petals with a sharp distinction between the narrow claw and broad blade.
16. Lower floral bracts acuminate.
17. Anthers exserted. Argentina: Santa Fé....61. D. ragonesei
17. Anthers equaling the petals or shorter.
18. Scape-bracts distinctly serrulate.
19. Pedicels 3-10mm long.
20. Sepals rounded, obtuse or obscurely apiculate.
21. Leaf-blades pectinate-serrate with flat spines 6 mm long. Brazil: Minas Gerais.....88. D. pectinata
21. Leaf-blades with spines laxer, uncinate and not over 3.5 mm long
22. Pedicels not over 5 mm long.
23. Floral bracts ample, covering much of the sepals; leaf-blades glabrous and lustrous above. Brazil: Distrito Federal.....37. D. brasiliana
23. Floral bracts small and inconspicuous, not covering much if any of the sepals; leaf-blades densely lepidote above at least initially. Brazil: Minas Gerais.
24. Style nearly as long as the ovary; leaf-spines 3.5 mm long.....69. D. argentea
24. Style almost none; leaf-spines 1 mm long. 89. D. spinulosa
22. Pedicels to 10 mm long; filaments almost wholly connate. Brazil: Minas Gerais.....82. D. macropoda
20. Sepals acute; style very short.
25. Posterior sepals nearly straight, convex. Brazil: Rio de Janeiro to Paraná.....38. D. pseudococcinea
25. Posterior sepals strongly inflexed and carinate. Brazil: Santa Catarina.....16. D. cabrerae
19. Pedicels not over 2 mm long, very short and stout.
26. Floral bracts exceeding the lowest flowers and all the sepals. Brazil: Minas Gerais.....30. D. lagoensis
26. Floral bracts all exceeded by the sepals. Brazil: Rio Grande do Sul (?).....90. D. sellowiana
18. Scape-bracts entire or very obscurely serrulate.
27. Flowers to 15 mm long; petals about twice as long as the sepals. Brazil: Minas Gerais.....91. D. warmingii

27. Flowers 8-13 mm long; petals much less than twice as long as the sepals.
28. Leaves about 5 cm long; inflorescence subdense, short; flowers 8 mm long. Brazil: Minas Gerais.
92. D. consimilis

28. Leaves much longer; inflorescence lax, elongate.
29. Flowers secund, very lax; lower floral bracts barely exceeding the pedicels; petals brown. Brazil: Bahia
93. D. secunda

29. Flowers not secund.
30. Leaf-blades 5 mm wide, 10-15 cm long. Brazil: Goiás.
94. D. stenophylla

30. Leaf-blades much wider and longer.
31. Style 1/3 as long as the ovary; sepals broadly acute and apiculate. Brazil: Piauí, Bahia, Minas Gerais
83. D. dissitiflora

31. Style very short or none.
32. Petal-blade elliptic, longer than wide. Brazil: Minas Gerais, Goiás.....84 . D. saxatilis
32. Petal-blade very broadly obovate, wider than long. Brazil: Goiás.....95. D. aurea

16. Lower floral bracts rounded or broadly acute, obtuse or apiculate.
33. Leaf-blades 7 mm wide with mostly subopposite spines 5-7 mm long. Brazil: Goiás.....96. D. dawsonii
33. Leaf-blades wider and with much smaller spines.
34. Floral bracts barely if at all exceeding the slender 4-6 mm long pedicels; style distinct.
35. Leaf-blades densely lepidote beneath; pedicels twice as long as the floral bracts. Brazil: Goiás.
97. D. racemosa

35. Leaf-blades densely lepidote on both sides; pedicels slightly shorter than the floral bracts. Brazil.
98. D. lutziana

34. Floral bracts much exceeding the pedicels.
36. Style distinct, 2 mm or longer.
37. Sepals very broadly elliptic, 7-9 mm long, more than twice the floral bracts; style 1/3 to 1/2 as long as the ovary. Bolivia..... 99. D. gracilis
37. Sepals suborbicular or subreniform, 5-7 mm long, slightly if at all exceeding the floral bracts; style about as long as the ovary. Argentina: Misiones.
38. Pedicels 2-4 mm long, stout, angled.
60. D. niederleinii

38. Pedicels lacking (?).....86. D. mitis

36. Style short, not over 1 mm, or none.
39. Lower floral bracts 7-15 mm long, from nearly equaling to slightly exceeding the sepals; leaves 14-24 cm.
40. Floral bracts ample, covering much of the sepals. Brazil: Goiás.....95. D. aurea

40. Floral bracts narrow, not covering the sepals. Brazil: Minas Gerais.....59. D. rariflora

39. Lower floral bracts 4-5 mm long, much shorter than the sepals; leaves 50-120 cm long.
41. Flowers pedicellate for 3 mm. Brazil: Pará. 100. D. paraensis
41. Flowers subsessile. Paraguay.....40. D. virgata

1. D. PEDICELLATA Mez in DC. Mon. Phan. 9: 515. 1896. Type: Schwacke 8413. Identity with the genus Dyckia is uncertain because of the lack of petals and stamens. The plant might be an Encholirium.

2. D. MARITIMA Baker, Handb. Brom. 136. 1889. Type: Tweedie s. n. Prionophyllum maritimum (Baker) Mez in DC. Mon. Phan. 9: 542. 1896. Dyckia tomentosa Mez in DC. Mon. Phan. 9: 515. 1896. Type: Sellow Brom. Paris 73.

3. D. SELLOA (K. Koch) Baker, Handb. Brom. 136. 1889. Prionophyllum selloum K. Koch, Ind. Sem. Hort. Berol. 1873, App. 4: 7. 1874. Type: Sellow 3339. Dyckia grandifolia Baker, Handb. Brom. 136. 1889. Type: Saint Hilaire 276. D. macracantha Baker, op. c. 137. Type: Sellow Brom. Paris 75. D. myriostachya Baker, l. c. Type: Sellow Brom. Paris 76.

4. D. INSIGNIS Hassler, Ann. Cons. & Jard. Bot. Genève 20: 316 Feb. 1919. Type: Fiebrig 4615. D. insignis lusus flaviflora Hassler, op. c. 317. Type: Fiebrig 4867. D. insignis var. macrantha Hassler, op. c. 318. Type: Fiebrig 5310-a. D. insignis var. obtusiflora Hassler, l. c. Type: Fiebrig 5310. D. grandiflora Mez, Fedde Rep. Spec. Nov. 16: 68. Nov. 1919. Type: Fiebrig 4615.

5. D. EXSERTA L. B. Smith, Rev. Argent. Agron. 8: 192, fig. 1-5. 1941. Type: Rojas 7563.

6. D. ODORATA L. B. Smith, Phytologia 10: 485, pl. 2, fig. 8, 9. 1964. Type: Dawson 14578.

7. D. PRINCEPS Lem. Jard. Fleur. 3: pl. 224, 225. 1853. Type: Description & plates.

8. D. URSINA L. B. Smith, Arquiv. Bot. Estado S. Paulo n. ser. 1: 109, pl. 111. 1943. Type: Foster 636.

9. D. VESTITA Hassler, Ann. Cons. & Jard. Bot. Genève 20: 315. 1919. Type: Fiebrig 5311.

10. D. MONTICOLA Smith & Reitz in Reitz, Sellowia no. 14: 104, fig. 3. 1962. Type: Reitz & Klein 4789.

11. D. FRIGIDA Hook. f. Bot. Mag. 103: pl. 6294. 1877. Type: Hort. Linden. Pourretia frigida sensu Hook. f. l. c., not Linden 1853, which is obviously some species of Puya with blue petals and coming from Colombia. Dyckia regalis Linden & Morr. ex Baker, Handb. Brom. 134, 1889, nomen in synon., quite possibly based on a descendant of D. frigida.

12. D. ENCHOLIRIOIDES (Gaud.) Mez in DC. Mon. Phan. 9: 507. 1896.

Var. a. ENCHOLIRIOIDES. Garrelia encholirioides Gaud. Atl. Voy. Bonite pl. 115. 1851. Type: Gaudichaud 130. Encholirion garreli Beer, Bromel. 27. 1857, nom. nov. Dyckia catharinensis K. Koch, Ind. Sem. Hort. Berol. 1873, App. 4: 4. 1874. Type: Gaudichaud s. n. D. altissima sensu Baker, Handb. Brom. 134.

1889, in part, as to Garrelia encholirioides Gaud. ? D. catharinensis var. dentata Wittm. Bot. Jahrb. 13, Beibl. 29: 17. 1891. Type: Schenck 456. Encholirion catharinense (K. Koch) Benth. & Hook. f. ex Mez in Engl. Pflanzenreich IV, 32: 320. 1935, nomen. Axes of the inflorescence and the sepals yellow.

Var. b. RUBRA (Wittm.) Reitz, Anais Bot. Herb. Barbosa Rodrigues no. 3: 108. 1951. D. rubra Wittm. Bot. Jahrb. 13, Beibl. 29: 16. 1891. Type: Schenck 619. Axes of the inflorescence and the sepals red.

13. D. CINEREA Mez in Mart. Fl. Bras. 3, pt. 3: 469. 1894. Type: Glaziou 18570.

14. D. TRICHOSTACHYA Baker, Handb. Brom. 133. 1889. Type: Sellow Brom. Paris 59. D. micracantha Baker, op. c. 135. Type: Sellow 1097.

15. D. BRACTEATA (Wittm.) Mez in Mart. Fl. Bras. 3, pt. 3: 470 1894. D. dissitiflora var. bracteata Wittm. Bot. Jahrb. 13, Beibl. 29: 16. 1891. Type: Schenck 3510.

16. D. CABRERAE Smith & Reitz in Reitz, Sellowia no. 14: 101, fig. 2. 1962. Type: Smith, Reitz & Sufridini 9262.

17. D. ELATA Mez in DC. Mon. Phan. 9: 508. 1896. Type: Schwacke 8739.

18. D. GOIANA L. B. Smith, sp. nov. A D. elata Mez, cui verisimiliter affinis, sepalis latissime deltoideo-ovatis differt.

PLANT flowering to 2.5 m high. LEAVES lacking (but judging from the lower scape-bracts) narrowly triangular, pungent, very laxly spinose-serrate, covered on both sides with appressed whitish scales at least at first. SCAPE stout, soon glabrous; scape-bracts exceeding the internodes, the lower presumably foliaceous, the upper ovate with a long narrowly triangular apex, serrulate. INFLORESCENCE laxly compound, 1 m long, finely cinereous-lepidote at first; primary bracts like the upper scape-bracts, to 7 cm long; main axis stout; lateral branches suberect, slender, slightly flexuous, to 5 dm long; floral bracts broadly ovate, serrulate, the lower long-acuminate and exceeding the flowers, the upper apiculate and shorter than the sepals; pedicels suberect, stout but distinct, to 4 mm long (fruit). SEPALS broadly deltoid-ovate, to 6 mm long, equally wide, ecarinate, persistently lepidote; petals 10-12 mm long, orange, the blade spreading, elliptic, rounded, carinate, about equaling the stamens; filaments short-connate above the common tube; style distinct, 1 mm long. Pl. I, fig. 1: Margin of lower scape-bract x 1 fig. 2: Flower x 1; fig. 3: Sepal x 2; fig. 4: Young stamens x 2; fig. 5: Young pistil x 2.

BRAZIL: Goiás: Cerrado, Côrrego Estrema, ca 42 km northeast of Formosa, Serra do Morcêgo, alt. 800 m, 20 April 1966, H. S. Irwin et al. 15163 (US, type: NY).

19. D. CHORISTAMINEA Mez, Fedde Rep. Spec. Nov. 16: 71. 1919. Type: Malme s. n.

20. D. SIMULANS L. B. Smith, Arquiv. Bot. Estado S. Paulo n. ser. 1: 108, pl. 110. 1943. Type: Foster 570.

21. D. FOSTERIANA L. B. Smith, Arquiv. Bot. Estado S. Paulo n. ser. 1: 107, pl. 106. 1943. Type: Foster 1154.

22. D. REMOTIFLORA Otto & Dietr. Allg. Gartenz. 1: 129. 1833. Type: (Sellow) Hort. Berol.

Var. a. REMOTIFLORA. D. rariflora sensu Graham, Bot. Mag. 62: pl. 3449. 1835; sensu Lindl. Bot. Reg. 21: pl. 1782. 1836, non Schult. f. 1830. D. rariflora var. "D. remotiflora" Baker, Handb Brom. 132. 1889. D. rariflora var. cunninghami Baker, l. c. Type: Cunningham. D. vaginosa Mez in Mart. Fl. Bras. 3, pt. 3: 490. 1894. Type: Glaziou 15497. Upper scape-bracts and floral bracts with broad apiculate summits; sepals cucullate, 8-10 mm long; petals 17-23 mm long.

Var. b. MONTEVIDENSIS (K. Koch) L. B. Smith, Arquiv. Bot. Estado S. Paulo n. ser. 1: 108. 1943. D. montevidensis K. Koch, Ind. Sem. Hort. Berol. 1873, App. 4: 4. 1874. Type: (Sellow) Hort. Berol. D. rariflora var. "D. montevidensis" Baker, Handb. Brom. 132. 1889. D. rariflora var. montevidensis (K. Koch) Baker ex Hauman & Vanderveken, An. Mus..Nac. Hist. Nat. Buenos Aires 29: 239. 1917. Upper scape-bracts and floral bracts with broad apiculate summits; sepals nearly or quite straight, 6-8 mm long; petals 11-17 mm long.

Var. c. ANGUSTIOR L. B. Smith, Arquiv. Bot. Estado S. Paulo n. ser. 1: 108. 1943. Type: Bornmueller 351.

23. D. MINARUM Mez in Mart. Fl. Bras. 3, pt. 3: 483, pl. 91. 1894. Type: Regnell II-283.

24. D. DUARTEANA L. B. Smith, sp. nov. A D. ursina L. B. Smith, cui affinis, bracteis florigeris serrulatis, pedicellis distinctis, sepalis minoribus differt.

PLANT flowering 6 dm high. LEAVES (inner) to 17 cm long; sheaths ovate, 3 cm long; blades 7 mm wide, laxly and finely serrate, covered with appressed cinereous scales on both sides, becoming glabrous especially beneath. SCAPE 5 mm in diameter, ferruginous-lanate at first; scape-bracts broadly ovate with long linear blades, serrulate, all but the highest exceeding the internodes. INFLORESCENCE pseudosimple with one-flowered branches, very lax, over 3 dm long, densely ferruginous-lanate; lower floral bracts like the scape-bracts, exceeding the flowers; pedicels suberect to spreading, to 8 mm long. SEPALS broadly ovate, acuminate and thickened at apex, 10-12 mm long, fimbriate, ecarinate, nerved; petals 15 mm long, orange (! Duarte), the blades suberect, broadly obovate, ecarinate; stamens included; filaments free above the common tube; stigmas sessile. Pl. I, fig. 6: Margin of inner leaf x 1; fig. 7: Flower x 1; fig. 8: Sepal x 2.

BRAZIL: Minas Gerais: Wet campo, km 137 on Estrada da Conceição, Serra do Cipó, alt. 1300 m, 21 April 1955, A. P. Duarte 2749 (RB 70533, type; phot. US).

25. D. IRMGARDIAE L. B. Smith, Phytologia 13: 150, pl. 7, figs 8, 9. 1966. Type: L. B. & R. C. Smith, I. Schultz & Oyara s. n.

26. D. REITZII L. B. Smith, Anais Bot. Herb. Barbosa Rodrigues 2: 14, pl. 1-3. 1950. Type: Reitz 2690.

27. D. HATSCHBACHII L. B. Smith, sp. nov. A D. encholirioide (Gaud.) Mez, cui verisimiliter affinis, bracteis florigeris inconspicuis, pedicellis elongatis, sepalis acutis differt.

PLANT known only from fragments, flowering 1.5 m high (! Hatschbach). LEAVES to 85 cm long; sheaths inconspicuous; blades linear-triangular, pungent, 45 mm wide, laxly serrate with antrorse uncinate dark spines 7 mm long, covered beneath with white appressed scales, initially or soon glabrous above. SCAPE (upper) slender, ferruginous-tomentose; scape-bracts imbricate, linear-triangular from an ovate base, serrulate. INFLORESCENCE simple, sublax, 4 dm long, many-flowered, ferruginous-tomentulose except the petals; floral bracts narrowly triangular, the lowest slightly exceeding the pedicels, serrulate; pedicels spreading, straight, slender, to 10 mm long. SEPALS ovate, acute, 8 mm long, carinate; petals 14 mm long, the blades subrhombic, curved-spreading; stamens included; filaments free above the common tube; styles 3, to 2 mm long. Pl. I, fig. 9: Leaf-margin x 1; fig. 10: Flower and bract x 1; fig. 11: Pistil x 2.

BRAZIL: Paraná: Mun. Paranaguá: Low woods of restinga, 1 Nov. 1951, Hatschbach 2725 (US, type).

28. D. EMINENS Mez, Bot. Jahrb. 30, Beibl. 67: 5. 1901. Type: Glaziou 22192-a.

29. D. DENSIFLORA Schult. f. in Roem. & Schult. Syst. 7, pt. 2: 1194. 1830. Type: Martius s. n.

30. D. LAGOENSIS Mez in Mart. Fl. Bras. 3, pt. 3: 483. 1894. Type: Warming 2171.

31. D. FERRUGINEA Mez in DC. Mon. Phan. 9: 533. 1896. Type: Kuntze s. n.

32. D. TENUIS Mez in Mart. Fl. Bras. 3, pt. 3: 484. 1894. Type: Gardner 3479. D. morreniana Mez in Mart. Fl. Bras. 3, pt. 3: 496. 1894. Type: Hort. Liége. D. kuntzeana Mez in DC. Mon. Phan. 9: 523. 1896. Type: Kuntze s. n.

33. D. SCHWACKEANA Mez in Mart. Fl. Bras. 3, pt. 3: 478. 1894. Type: Glaziou 18572.

34. D. BREVIFOLIA Baker in Saund. Ref. Bot. 4: pl. 236. 1871. Type: Hort. Kew. D. sulphurea K. Koch, Ind. Sem. Hort. Berol. 1873, App. 4: 3. 1874. Type: Hort. Berol. D. rariflora sensu Wittm. Bot. Jahrb. 13, Beibl. 29: 15. 1891, non Schult. f. 1830. D. princeps Hort. ex Mez in Mart. Fl. Bras. 3, pt. 3: 493. 1894, in part., non Lem. 1853. D. gemellaria E. Morr. ex Mez, op. c. 494. Type: Hort. Liége.

35. D. BURCHELLII Baker, Handb. Brom. 131. 1889. Type: Burchell 8178.

36. D. DUSENII L. B. Smith, Contr. Gray Herb. 98: 6, pl. 2. 1932. Type: Dusén 18081.

37. D. BRASILIANA L. B. Smith, sp. nov. A D. pseudococcinea L. B. Smith, cui affinis, bracteis florigeris amplis flores inclusos superantibus differt.

PLANT flowering to 1.5 m high. LEAVES numerous in a dense rosette, over 3 dm long; sheaths suborbicular, castaneous; blades linear-triangular, 2-3 cm wide, laxly retrorse-serrate with slender spines 2.5 mm long, covered with appressed whitish scales beneath, glabrous above. SCAPE 6 mm in diameter, sparsely and finely white-lepidote, soon glabrous; scape-bracts lance-ovate, acuminate, serrulate, very irregularly longer and shorter than

the internodes. INFLORESCENCE simple, elongate, laxly many-flowered, finely and fugaciously white-lepidote; floral bracts ovate, acuminate, ample, serrulate, the lowest exceeding the flowers; pedicels subcylindric, 5-7 mm long. SEPALS suborbicular, 9 mm long, cucullate; petals 15 mm long, orange (! Irwin), the blade broadly obovate, suberect to spreading; stamens included; filaments connate above the common tube; style very short. Pl. I, fig. 13: Leaf-margin x 1; fig. 14: Flower and bract x 1; fig. 15: Sepal x 2.

BRAZIL: Distrito Federal: Campo cerrado, Brasilia, 14 Nov. 1958, E. Pereira 4685 & Pabst 5011 (RB, phot. US); rooted in termite nest, cerrado, Brasilia, alt. 975 m, 13 Nov. 1965, H. S. Irwin et al. 10268 (US, type; NY); cerrado and gallery margin, 3 km north of Sobradinho, alt. 1225 m, 9 Nov. 1965, Irwin et al. 10113 (NY).

Very old material doubtfully referred here: Cerrado, 5 km north of Planaltina, on road to São Gabriel de Goiás, Goiás, alt. 1200 m, 16 Oct. 1965, Irwin et al. 9257(NY, US); cerrado, summit of Chapada da Contagem, alt. 1100 m, 14 Jan. 1966, Irwin et al. 11659 (NY, US).

38. D. PSEUDOCOCCINEA L. B. Smith, Arquiv. Bot. Estado S. Paulo n. ser. 1; 108, pl. 109, fig. 1. 1943. Type: Foster 1144.

39. D. SILVAE L. B. Smith, Phytologia 13: 151, pl. 7, fig. 14, 15. 1966. Type: N. T. Silva 784.

40. D. VIRGATA Mez, Fedde Rep. Spec. Nov. 16: 68. 1919. Type: Rojas 46.

41. D. WEDDELLIANA Baker, Handb. Brom. 132. 1889. Type: Weddell 2584.

42. D. MARACASENSIS Ule, Bot. Jahrb. 42: 197. 1908. Type: Ule 7019.

43. D. DISTACHYA Hassler, Ann. Cons. & Jard. Bot. Genève 20: 308. Feb. 1919. Type: Fiebrig 5648. D. distachya forma induta Hassler, op. c. 309. Type: Fiebrig 5824. D. interrupta Mez, Fedde Rep. Spec. Nov. 16: 70. Nov. 1919. Type: Fiebrig 56 48.

44. D. FEROX Mez in DC. Mon. Phan. 9: 511. 1896. Type: Kuntze s. n. D. meziana Kuntze, Rev. Gen. 3, pt. 2: 302. 1898. Type: Kuntze s. n. D. hamosa Mez, Fedde Rep. Spec. nov. 3: 33. 1906. Type: Fiebrig 685 e. p. D. ferox f. australis Hassler, Ann. Cons. & Jard. Bot. Genève 20: 303. 1919. Type: Kuntze s. n. D. ferox f. vulgaris Hassler, l. c. Lectotype: Hassler 2310. D. ferox subsp. hamosa (Mez) Hassler, op. c. 304. D. ferox f. hamosa (Mez) Castellanos, An. Mus. Nac. Hist. Nat. Buenos Aires 37: 496. 1933.

45. D. VELASCANA Mez in Mart. Fl. Bras. 3, pt. 3: 476. 1894. Type: Hieronymus & Niederlein 66.

46. D. CHAGUAR Castellanos, An. Mus. Nac. Hist. Nat. Buenos Aires 36: 373, pl. 4. 1931. Type: Spegazzini s. n.

47. D. VELLOZIIFOLIA Mez, Fedde Rep. Spec. Nov. 16: 70. 1919. Type: Hassler 9576.

48. D. MICROCALYX Baker, Handb. Brom. 133. 1889. Type: Balansa 696.

Var. a. MICROCALYX. D. microcalyx var. inermis Hassler, Ann.

Cons. & Jard. Bot. Genève 20: 307. 1919. Type: Hassler 8787. D. microcalyx var. micrantha Hassler, op. c. 308. Type: Fiebrig 5941. D. minutiflora Mez, Fedde Rep. Spec. Nov. 16: 67. 1919. Type: Fiebrig 5941. Sepals 3-4 mm long.

Var. b. OSTENII L. B. Smith, Contr. Gray Herb. 104: 73, pl. 3, fig. 16. 1934. Type: Osten & Rojas 8097. Sepals 6 mm long.

49. D. LEPTOSTACHYA Baker, Gard. Chron. 1884, pt. 2: 198. 1884 Type: Hort. Kew. D. conspicua Mez in DC. Mon. Phan. 9: 513. 1896 Type: Balansa 4742. D. boliviensis Mez, op. c. 524. Type: D'Orbigny 858. D. hassleri Mez, Bull. Herb. Boiss. ser. II, 3: 134. 1903. Type: Hassler 3261. D. rojasii Mez, Fedde Rep. Spec. Nov. 16: 67. 1919. Type: Rojas in Hassler 10884. D. apensis Mez, op. c. 69. Lectotype: Hassler 4061. D. longifolia Mez, l. c. Type: Rojas in Hassler 10500. D. remotiflora var. montevidensis sensu L. B. Smith, Anais Bot. Herb. Barbosa Rodrigues 2: 45. 1950, not as to type.

50. D. MELLO-BARRETOI L. B. Smith, Phytologia 7: 109, pl. 1, fig. 16-19. 1960. Type: Mello Barreto 2122.

51. D. IBIRAMENSIS Reitz, Sellowia no. 14: 104, fig. 4. 1962. Type: Reitz & Klein 2635.

52. D. AFFINIS Baker, Handb. Brom. 133. 1889. Type: Balansa 534.

53. D. PULQUINENSIS Wittm. Mededeel. Rijks Herb. Leiden no. 29: 88. 1916. Type: Herzog 1849.

54. D. FLORIBUNDA Griseb. Symb. Argent. in Goett. Abh. 24: 331. 1879. Type: Hieronymus 566. D. gilliesii Baker, Handb. Brom. 136. 1889. Type: Gillies s. n.

55. D. COMMIXTA Hassler, Ann. Cons. & Jard. Bot. Genève 20: 305. 1919. Type: Chodat & Vischer 97 e. p.

56. D. OROBANCHOIDES Mez in Mart. Fl. Bras. 3, pt. 3: 475. 1894. Type: Tamberlik s. n.

57. D. TOBATIENSIS Hassler, Ann. Cons. & Jard. Bot. Genève 20: 309. 1919. Type: Hassler 2099.

58. D. IRWINII L. B. Smith, sp. nov. A D. racemosa Baker, cujus bracteas floresque valde imitans, inflorescentia ramosa, stylo brevissimo differt.

PLANT flowering to 2.25 m high. LEAVES 6-7 dm long; sheaths suborbicular, 4 cm long, castaneous with pale margins; blades linear-triangular, pungent, 20-25 mm wide, laxly serrate with brown spines 2 mm long, covered with appressed whitish scales on both sides, becoming partially glabrous above. SCAPE lateral, 10 mm wide, pale-lepidote, becoming glabrous; lower scape-bracts subfoliaceous, the upper narrowly triangular from a broadly ovate base, much shorter than the internodes, serrulate. INFLORESCENCE laxly few-branched, 1 m long, finely cinereous-lepidote, becoming glabrous with age; primary bracts like the upper scape-bracts, much shorter than the sterile bracteate bases of the branches; branches suberect, slightly flexuous, slender, elongate; floral bracts broadly ovate, apiculate, mostly shorter than the pedicels; flowers lax, secund, curved-ascending; pedicels slender, to 5 mm long. SEPALS broadly ovate, obtuse, 6-8 mm long; petals 9 mm long (at least), the blade suberect, broadly obovate; stamens

included; filaments connate above the common tube; stigmas subsessile. CAPSULES ovoid, acute, 15 mm long; seeds with a broad rounded subfalcate wing. Pl. I, fig. 16: Leaf-margin x 1; fig. 17: Flower and bract x 1; fig. 18: Sepal x 2; fig. 19: Petal x 2.

BRAZIL: Mato Grosso: Cerrado, 30 km south of Xavantina, drainage of the upper Rio Araguaia, alt. 400 m, 11 June 1966, Irwin et al. 16923 (US, type; NY); cerrado and campo margin, 75 km south of Xavantina, alt. 525 m, 17 June 1966, Irwin et al. 17340 (NY).

59. D. RARIFLORA Schult. f. in Roem. & Schult. Syst. 7, pt. 2: 1195. 1830. Type: Martius s. n.

60. D. NIEDERLEINII Mez in Mart. Fl. Bras. 3, pt. 3: 474. 1894 Type: Niederlein 229 e. p. D. missionum Mez, op. c. 477. Type: Niederlein 229 e. p. D. missionum var. breviflora Hassler, Ann. Cons. & Jard. Bot. Genève 20: 316. 1919. Type: Hassler 142.

61. D. RAGONESEI Castellanos, Lilloa 10: 454, fig. 2. 1944. Type: Castellanos s. n.

62. D. SORDIDA Baker, Handb. Brom. 132. 1889. Type: Saint Hilaire 402.

63. D. TOMENTELLA Mez, Fedde Rep. Spec. Nov. 16: 69. 1919. Type: Fiebrig 4046.

64. D. OLIGANTHA L. B. Smith, Arquiv. Jard. Bot. Rio de Janeiro 15: 329, fig. h-l. 1958. Type: Duarte 2748.

65. D. BIFLORA Mez in Mart. Fl. Bras. 3, pt. 3: 486. 1894. Type: Glaziou 19919.

66. D. DUCKEI L. B. Smith, Bol. Mus. Paraense Emílio Goeldi n. ser. no. 1: 3, fig. k-o. 1958. Type: Ducke s. n.

67. D. TWEEDIEI Mez in Mart. Fl. Bras. 3, pt.3: 485. 1894. Type: Tweedie s. n.

68. D. HELOISAE L. B. Smith, Smithsonian Misc. Coll. 126: 26, 65, fig. 16. 1955. Type: L. B. Smith et al. 6698.

69. D. ARGENTEA Mez in Mart. Fl. Bras. 3, pt. 3: 492. 1894. Type: Glaziou 17280-a.

70. D. LINEARIFOLIA Baker, Handb. Brom. 131. 1889. Type: Saint Hilaire 1010.

71. D. HILAIREANA Mez in DC. Mon. Phan. 9: 530. 1896. Type: Saint Hilaire 924.

72. D. MARNIER-LAPOSTOLLEI L. B. Smith, Bromel. Soc. Bull. 16: 102, fig. 1966. Type: Marnier-Lapostolle s. n.

73. D. MACEDOI L. B. Smith, Arquiv. Bot. Estado S. Paulo n. ser. 2: 195. 1952; Smithsonian Misc. Coll. 126: 67, 68, fig. 18. 1955. Type: Macedo 2974.

74. D. SICKII L. B. Smith, Arquiv. Jard. Bot. Rio de Janeiro 15: 330, fig. m-q. 1958. Type: Sick B-613.

75. D. PUMILA L. B. Smith, Phytologia 13: 151, pl. 7, fig. 13. 1966. Type: Irwin & Soderstrom 7365.

76. D. SUBINERMIS Mez in Mart. Fl. Bras. 3, pt. 3: 487. 1894. Type: Niederlein 1205.

77. D. GLANDULOSA L. B. Smith & Reitz, sp. nov. Ab omnibus speciebus adhuc cognitis inflorescentiae indumento glanduliforme facile distinguenda.

PLANT flowering 7 dm high. LEAVES to 23 cm long; sheaths suborbicular, 2 cm long; blades narrowly triangular, acuminate to an

abruptly acute pungent apex, 23 mm wide, laxly serrate with uncinate antrorse spines 2 mm long, covered beneath with cinereous appressed scales, smooth and glabrous above. SCAPE 6 mm in diameter, laxly glandular-lepidote with yellow trichomes ca 0.07 mm high; scape-bracts numerous but small and covering very little of the scape, triangular, entire, the lowest linear-laminate and bearing some peltate scales, all the others vestite with glandular trichomes alone, the highest shorter than the internodes. INFLORESCENCE simple, laxly many-flowered, to 27 cm long, laxly glandular-vestite except the petals; floral bracts triangular-ovate, acuminate, entire, the lowest exceeding the sepals; pedicels spreading, subcylindric, 5 mm long. SEPALS ovate, obtuse, 7 mm long, cucullate, ecarinate, rugose in drying as if initially fleshy; petals 12 mm long, orange (! Magalhães), the blade rhombic, obtuse, carinate; stamens included; filaments free above the common tube; style 1 mm long. Pl. I, fig. 20: Leaf-margin x 1; fig. 21: Trichome x 100; fig. 22: Flower and bract x 1: fig. 23: Sepal x 2; fig. 24: Pistil x 2.

BRAZIL: Minas Gerais: In smallsparse groups among rocks at the base of the Serra do Itambé, 19 March 1963, M. Magalhães 18959 (Hb. Bradeanum 25726, type: phot. US).

78. D. DELTOIDEA (L. B. Smith) L. B. Smith, stat. nov. D. coccinea var. deltoidea L. B. Smith, Arquiv. Bot. Estado S. Paulo n. ser. 1: 107. 1943. Type: Dusén 17357. D. tuberosa var. deltoidea (L. B. Smith) L. B. Smith, op. c. 2: 119. 1950.

79. D. TUBEROSA (Vell.) Beer, Bromel. 157. 1857. Tillandsia tuberosa Vell. Fl. Fluminensis 135. 1825; Icon. 3: pl. 136. 1835. Type: Description & plate. Dyckia coccinea Mez in Mart. Fl. Bras. 3, pt. 3: 491. 1894. Type: "Sellow e. n. 23".

80. D. MACHRISIANA L. B. Smith, Los Angeles County Mus. Contr. Sci. no. 17: 7, fig. 5. 1957. Type: Dawson 14153-a.

81. D. ELONGATA Mez in DC. Mon. Phan. 9: 529. 1896. Type: Sellow Brom. Paris 58.

82. D. MACROPODA L. B. Smith, sp. nov. D. duarteanam L. B. Smith (cf. supra) simulans sed bracteis florigeris inferioribus haud lineari-laminatis, sepalis rotundatis, filamentis alte connatis differt.

PLANT flowering about 4 dm high. LEAVES 25 cm long; sheaths suborbicular, 3 cm long, stramineous; blades narrowly triangular, acuminate to a fine rigid point, laxly serrate with retrorsely uncinate spines 1.5 mm long, covered beneath with appressed whitish (appearing ferruginous from soil) scales, smooth and glabrous above. SCAPE very short, finely ferruginous-lepidote; scape-bracts long-acuminate from an ovate base, subentire, the uppermost much shorter than the internode. INFLORESCENCE simple, laxly many-flowered, 25 cm long, finely ferruginous-lepidote except the petals; floral bracts like the scape-bracts, entire, the lowest exceeding the sepals; pedicels spreading, slenderly cylindric, to 10 mm long. SEPALS broadly ovate, rounded or apiculate, 7 mm long, strongly convex, the posterior more or less carinate; petals 14 mm long, orange (! E. Pereira), the blades broadly rhombic, carinate; stamens included; filaments almost wholly

connate; styles 3, very short. Pl. I, fig. 25: Leaf-margin x 1; fig. 26: Flower and bract x 1; fig. 27: Sepal x 2; fig. 28: Stamens and pistil x 2.

BRAZIL: Minas Gerais: Diamantina, Rio das Pedras, 29 May 1955, E. Pereira 1622 (RB 90642, type; phot. US).

83. D. DISSITIFLORA Schult. f. in Roem. & Schult. Syst. 7, pt. 2: 1194. 1830. Type: Martius s. n.

84. D. SAXATILIS Mez in DC. Mon. Phan. 9: 518. 1896. Type: Schwacke 8948.

85. D. ULEANA Mez in DC. Mon. Phan. 9: 517. 1896. Type: Ule 3134.

86. D. MITIS Castellanos, An. Mus. Nac. Hist. Nat. Buenos Aires 36: 51, pl. 2. 1929. Type: Spegazzini s. n.

87. D. HORRIDULA Mez, Bot. Jahrb. 30, Beibl. 67: 5. 1901. Type: Glaziou 22194.

88. D. PECTINATA L. B. Smith & Reitz, sp. nov. A D. dawsonii L. B. Smith, cujus folias valde simulans, bracteis florigeris angustis, staminibus inclusis differt.

PLANT flowering 75 cm high. LEAVES 14 cm long; sheaths broadly ovate, 2 cm long, stramineous basally; blades very narrowly triangular, subulate-acuminate, 8 mm wide, covered on both sides with appressed cinereous scales, becoming more or less glabrous above, subdensely pectinate-serrate with flat spreading spines 6 mm long. SCAPE 5 mm in diameter, glabrous; lower scape-bracts subfoliaceous, the upper narrowly triangular, thin, serrulate, irregularly shorter than the internodes. INFLORESCENCE simple, laxly many-flowered, 21 cm long, glabrous; floral bracts like the upper scape-bracts, serrulate, the lowest exceeding the sepals; pedicels spreading to reflexed, broadly obconic, 3 mm long, constricted at base. SEPALS broadly ovate, rounded, entire or apiculate, 7 mm long, rugose when dry as if formerly fleshy, little if at all carinate; petals 9 mm long, red-orange (! Pabst), the blades obovate, carinate; stamens included; filaments short-connate above the short common tube; stigmas sessile. Pl. I, fig. 29: Leaf-margin x 1; fig. 30: Flower and bract x 1; fig. 31: Sepal x 2; ;fig. 32: Stamens x 2.

BRAZIL: Minas Gerais: In xerophytic habitat, outcrop of Triassic sandstone, between Conceição do Rio Verde and Cambuquira, 16 June 1957, G. F. J. Pabst 4129 (Hb. Bradeanum 3766, type; phot. US).

89. D. SPINULOSA L. B. Smith & Reitz, sp. nov. A D. argentea Mez, cujus inflorescentiam simulans, foliorum spinis parvis, stylo subnullo differt.

PLANT flowering 85 cm high. LEAVES 35 cm long; sheaths suborbicular, 3 cm long, pale brown; blades linear-triangular, 16 mm wide, laxly serrate with mostly retrorse uncinate spines 1 mm long, covered with appressed cinereous scales on both sides, becoming more or less glabrous above. SCAPE lateral, 4 mm wide sparsely and finely pale-lepidote; scape-bracts ovate, serrulate, the lower dense and with long linear blades, the upper acuminate, shorter than the internodes. INFLORESCENCE simple, laxly many-flowered, to 27 cm long, finely white-lepidote at first; floral

bracts like the upper scape-bracts, serrulate, the lowest equaling the midpoint of the sepal; pedicels curved-ascending, slender, 5 mm long, angled, not constricted. SEPALS ovate, rounded and apiculate, 7 mm long, strongly convex; petals 10 mm long, blades rhombic; stamens included; filaments short-connate above the common tube; stigmas subsessile. Pl. I, fig. 33: Leaf-margin x 1; fig. 34: Flower and bract x 1; fig. 35: Sepal x 2; fig. 36: Stamens x 2.

BRAZIL: Minas Gerais: Varzea da Palma, Fazenda da Mãe d'Água, 19 Nov. 1962, A. P. Duarte 7409 (Hb. Bradeanum 27225, type: phot. US).

90. D. SELLOWIANA Mez in DC. Mon. Phan. 9: 520. 1896. Type: Sellow Brom. Paris 52.

91. D. WARMINGII Mez in Mart. Fl. Bras. 3, pt. 3: 481. 1894. Type: Warming s. n.

92. D. CONSIMILIS Mez in Mart. Fl. Bras. 3, pt. 3: 479, pl. 90. 1894. Type: Weddell 1407.

93. D. SECUNDA L. B. Smith, sp. nov. Ab omnibus speciebus adhuc cognitis inflorescentia laxissime secundiflora, petalis brunneis differt.

PLANT flowering 9 dm high. LEAVES over 25 cm long; sheaths unknown; blades very narrowly triangular, to 24 mm wide, laxly serrate with brown retrorse spines 2 mm long, covered on both sides with appressed cinereous scales becoming more or less glabrous above. SCAPE very slender, glabrous; lower scape-bracts subfoliaceous, the upper small, remote, triangular, acuminate, subentire. INFLORESCENCE simple, very laxly secund-flowered, to 23 cm long, sparsely and fugaciously pale-lepidote; floral bracts acute, entire, the lowest distinctly exceeding the pedicels; pedicels spreading, cylindric, 3 mm long. SEPALS ovate, rounded, 7 mm long, thin, brownish; petals 12 mm long, brown, apparently rather fleshy, the blades broadly rhombic, ecarinate; stamens included; filaments short-connate above the common tube; style ca 1 mm long. Pl. I, fig. 37: Leaf-margin x 1; fig. 38: Flower and bract x 1; fig. 39: Sepal x 2; fig. 40: Stamens x 2; fig. 41: Pistil x 2.

BRAZIL: Bahia: Drainage of the Rio Corrente, western Bahia, Campinas, ca 10 km south of Rio Piau, ca 150 km south of Barreiras, 850 m, 13 April 1966, Irwin et al. 14723 (NY, type; phot. US).

94. D. STENOPHYLLA L. B. Smith, sp. nov. A D. saxatile Mez, cujus inflorescentiam simulans, foliorum laminis angustissimis differt.

PLANT flowering to 3 dm high. LEAVES numerous in a dense globose rosette, to 16 cm long; sheaths suborbicular, 2 cm long, brown; blades linear, finely subulate-acuminate, 5 mm wide, laxly serrate with slender recurved spines 2 mm long, at first covered on both sides with appressed whitish scales but soon glabrous. SCAPE 2 mm thick, glabrous; scape-bracts small, broadly ovate, microscopically serrulate, the lowest linear-laminate, the others acuminate, remote. INFLORESCENCE simple, laxly few-flowered to 10 cm long, fugaciously white-lepidote; floral bracts like the

upper scape-bracts, the lowest equaling the sepals or shorter, microscopically serrulate; pedicels ca 1 mm long, stout but distinct. SEPALS broadly ovate, rounded, 6 mm long; petals 8-10 mm long, orange, the blades broadly elliptic; stamens included; filaments connate above the common tube; stigmas sessile. Pl. I, fig. 42: Section of leaf x 1; fig. 43: Flower and bract x 1; fig. 44: Sepal x 2; fig. 45: Young petal x 2.

BRAZIL: Goiás: Mun. Cristalina: Rooted in soil-filled rocky crevices, locally common, 5 km south of Cristalina, alt. 1175 m, 1 Nov. 1965, Irwin et al. 9728 (US, type; NY).

95. D. AUREA L. B. Smith, sp. nov. A D. saxatile Mez, cui affinis, petalorum laminis latissime obovatis differt.

PLANT flowering ca 1 m high (! Irwin). LEAVES to 23 cm long; sheaths suborbicular, 2-3 cm lo ng, stramineous; blades strongly recurved, narrowly triangular, acuminate to an abruptly acute pungent apex, 3 cm wide, laxly serrate with recurved spines 1.5 mm long, finely lepidote in the narrow grooves beneath, glabrous above. SCAPE lateral, 4 mm wide, sparsely white-lepidote; scape-bracts broadly ovate, acuminate, the upper less than half as long as the internodes, entire. INFLORESCENCE simple, laxly many-flowered, 3 dm long, sparsely and fugaciously white-lepidote; floral bracts broadly ovate, acuminate, entire, the lowest exceeding the sepals; pedicels subcylindric, stout, 4 mm long. SEPALS ovate, broadly subacute, 8 mm long; petals 12 mm long; the blade obovate, broader than long; stamens equaling the petals; filaments connate above the common tube; style less than 1 mm long. Pl. I, fig. 46: Leaf-margin x 1; fig. 47: Flower and bract x 1; fig. 48: Sepal x 2; fig. 49: Petal x 2.

BRAZIL: Goiás: Campo, 15 km west of Cristalina, Serra dos Cristais, alt. 1200 m, 6 March 1966, Irwin et al. 13613 (US, type; NY).

96. D. DAWSONII L. B. Smith, Los Angeles County Mus. Contr. Sci. no. 17: 2, fig. 2-4. 1957. Type: Dawson 15236.

97. D. RACEMOSA Baker, Handb. Brom. 132. 1889: Type: Gardner 4015.

98. D. LUTZIANA L. B. Smith, Arquiv. Bot. Estado S. Paulo n. ser. 1: 107, pl. 107. 1943. Type: Foster 1144-b.

99. D. GRACILIS Mez in DC. Mon. Phan. 9: 516. 1896. Type: D'Orbigny 1006.

100. D. PARAËNSIS L. B. Smith, Phytologia 13: 150, pl. 7, fig. 10-12. 1966. Type: Fróes 30030.

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APPENDIX
(Doubtful and excluded taxa, named hybrids)

acaulis Baker, Handb. Brom. 137. 1889 = NAVIA ACAULIS Mart. ex Schult. f. in Roem. & Schult. Syst. 7, pt. 2: 1196. 1830.

altissima Lindl. Bot. Reg. 27: 84. 1841. The description: "scapi.....squamis.....integris" does not accord with any material that might be used as a lectotype in default of original material, so it seemsbest to keep this name in the dubious category.

argentea Nicholson, Dict. Gard. 1: 497. 1885 = HECHTIA ARGENTEA Baker in Hemsl. Biol. Centr. Am. Bot. 3: 317. 1884.

augustae Baker, Handb. Brom. 135. 1889. = CONNELLIA AUGUSTAE (Rich. Schomburgk) N. E. Brown, Trans. Linn. Soc. ser. II, 6: 66, pl. 13. 1901.

caulescens Baker, Handb. Brom. 137. 1889 = NAVIA CAULESCENS Mart. ex Schult. f. in Roem. & Schult. Syst. 7, pt. 2: 1195. 1830

decomposita Baker, Handb. Brom. 136. 1889 = DEUTEROCOHNIA LONGIPETALA (Baker) Mez in Mart. Fl. Bras. 3, pt. 3: 506, pl. 95. 1894.

desmetiana Baker, Bot. Mag. 120: pl. 7340. 1894 = HECHTIA DESMETIANA (Baker) Mez in DC. Mon. Phan. 9: 551. 1896.

gigantea K. Koch, Ind. Sem. Hort. Berol. 1873, App. 4: 4. 1874, nomen illeg., wrongly attributed to Lindley. As used by Koch, D. gigantea is an unnecessary substitute name for D. princeps Lem. Mez equates it with D. altissima Lindl. as perhaps Koch intended to do. I have found no material so namedand there the matter rests.

glaziovii Baker, Handb. Brom. 133. 1889 = NEOGLAZIOVIA VARIEGATA (Arr. Cam.) Mez in Mart. Fl. Bras. 3, pt. 3: 427, pl. 80, fig. 1. 1894.

grisebachii Baker, Handb. Brom. 130. 1889 = ABROMEITIELLA BREVIFOLIA (Griseb.) Castellanos, An. Mus. Nac. Hist. Nat. Buenos Aires 36: 371, pl. 2, 3, 6. 1931.

x Lad Cutak M. B. Foster, Bromel. Soc. Bull. 5: 35. 1955; 9: 61. 1959 = SULPHUREA x LEPTOSTACHYA.

laxiflora Mart. ex Baker, Handb. Brom. 134. 1889, nomen in synon. Baker and Mez give this as a synonym of D. altissima Lindl. but material of Ackermann from Minas Gerais, Brazil, in Brussels, has serrulate floral bracts and can scarcely be the same. It may well be an undescribed species but the material is inadequate for further action.

lemaireana Hort. ex Bull. Cat. no. 97: 5. 1874; Mez in Pflanzenreich IV, 32: 340. 1935 =?

longipetala Baker, Handb. Brom. 135. 1889 = DEUTEROCOHNIA LONGIPETALA (Baker) Mez in Mart. Fl. Bras. 3, pt. 3: 506, pl. 95. 1894.

ramosa Hort. ex K. Koch, Ind. Sem. Hort. Berol. 1873, App. 4: 4. 1874, nomen in synon. Equated with D. altissima Lindl. and D. princeps Lem., which are not the same, its identity therefore is wholly uncertain.

spectabile Baker, Handb. Brom. 138. 1889 = ENCHOLIRIUM SPECTABILE Mart. ex Schult. f. in Roem. & Schult. Syst. 7, pt. 2: 1233. 1830.

subsecunda Baker, Handb. Brom. 135. 1889 = ENCHOLIRIUM SUBSECUNDUM (Baker)Mez in DC. Mon. Phan. 9: 540. 1896.

Puya edulis E. Morr. Belg. Hort. 27:354. 1878; Mez in Pflanzenreich IV, 32: 340. 1935. Judging from the scanty description and area of origin, this is probably a species of Dyckia.

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Plate I

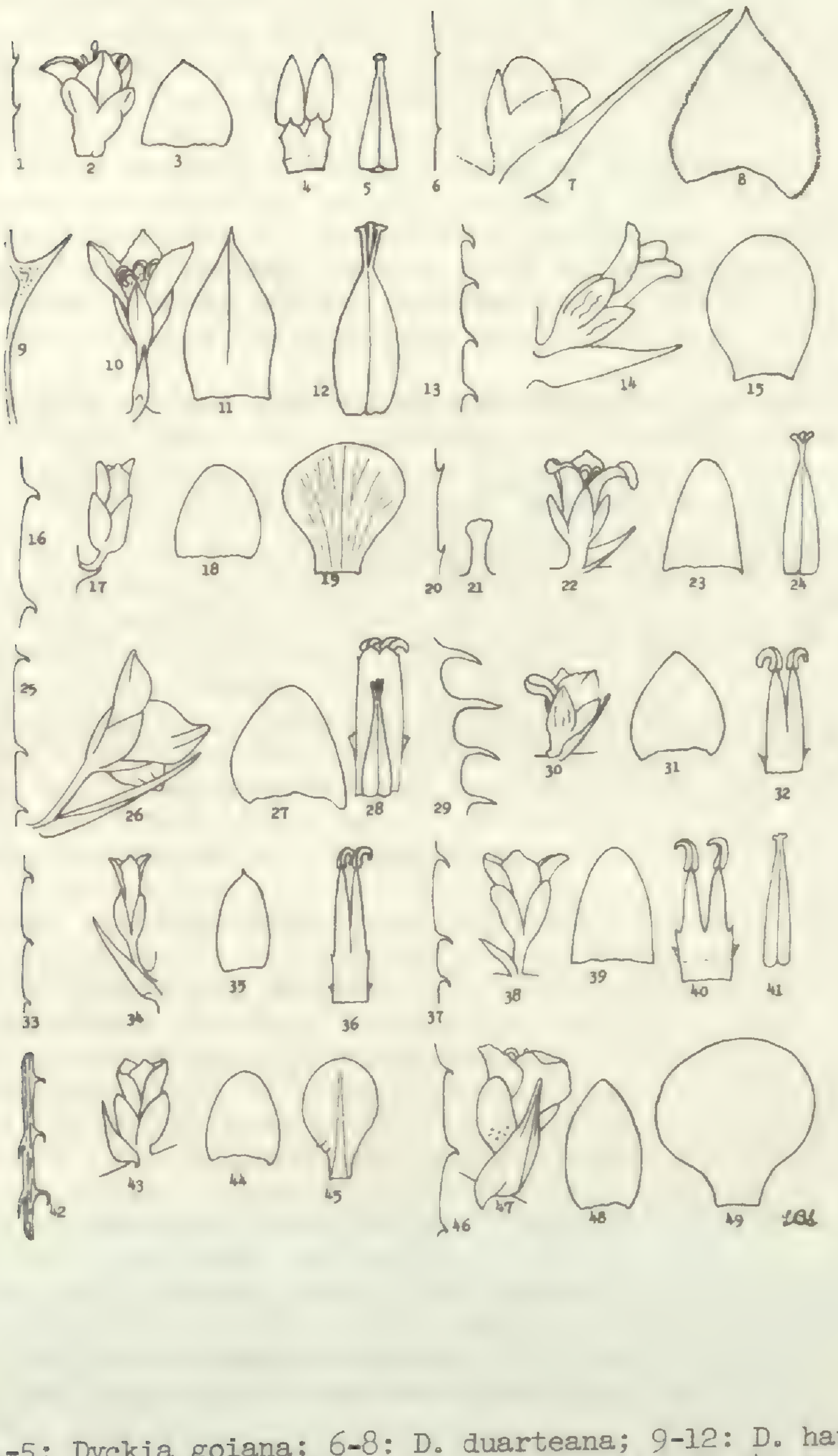


Fig. 1-5: Dyckia goiana; 6-8: D. duarteana; 9-12: D. hatschbachii; 13-15: D. brasiliana; 16-19: D. irwinii; 20-24: D. glandulosa; 25-28: D. macropoda; 29-32: D. pectinata: 33-36: D. spinulosa; 37-41: D. secunda; 42-45: D. stenophylla; 46-49: D. aurea.

ITINERARY OF WILLIAM JOHN BURCHELL IN BRAZIL, 1825-1830

Lyman B. Smith and Ruth C. Smith

Thanks to the hospitality of the director and staff of the Royal Botanic Gardens, Kew, England, it was possible to consult the field books of William John Burchell and prepare the present detailed account of his itinerary in Brazil. The intent of this paper is to follow in the tradition of the work of T. A. Sprague and N. Y. Sandwith on the itineraries of Humboldt and Bonpland. However, the problem is quite different, because Burchell did not publish any account of his collecting nor indicate localities or even states on his labels. Urban, in the introductory volume of the Flora Brasiliensis, gives a rough indication of general areas, but Burchell's collections deserve better treatment. Fortunately, his numbers are chronological and thus can be used as a guide and index.

We have made a list of the numbers and the dates and places at which these numbers were collected. Armed with this list, we have consulted the Millionth Maps of Hispanic America compiled and drawn by the American Geographical Society of New York, 1940, the Carta do Brasil ao Milionésimo published by the Instituto Brasileiro de Geografia e Estatistica, 1960, and many other old and recent maps of Brazil, its states and cities, which we found at The Smithsonian and at the Map Division of the Library of Congress. We also found old names of modern locations and other information in the Enciclopédia dos Municipios Brasileiros published by the Instituto Brasileiro de Geografia e Estatistica. In this way we have located a large percentage of the places at which Mr. Burchell collected - large enough and close enough together to plot out his itinerary with a reasonable amount of accuracy.

We are listing the numbers, their dates and the localities by latitude and longitude as far as we know. In this listing we are making comments, where necessary, on the places in between that we could not find, on relative locations within the larger cities, on the old and present names of places, and on any other details that may clarify this account. Our comments are in parentheses and everything else after each number is directly quoted from Mr. Burchell's field books.

Mr. Burchell started his collections within the city of Rio de Janeiro, the then national capital, now part of the State of Guanabara, with the numbers 701 - 1103 between 16 August and 29 September of 1825.

701 - 808, 16 Aug. 1825, along the aqueduct a mile and half above the convent of Santa Teresa (in the old part of Rio, S 22° 54', W 43° 10-12).

809 - 818, Near Mátopórcos, on stems of orange trees (in old city on northern slopes of Morro de Santos Rodrigues, west northwest of Gloria).

819 - 897, 8 Sept. 1825, along the aqueduct, as before.
898 - 991, 15 Sept. 1825, along the aqueduct from the Convent of Santa Teresa to the spot where it crosses the ridge in sight of the Valley of Laranjeiros (as) (S 22° 56', W 43° 11-12').
992 - 1007, Near Lagôa das Freitas on the road between Botafogo Bay and the Botanic Garden (S 22° 57', W 43° 12-13').
1008 - 1080, 26 Sept. 1825, hill of N. Sa. (Nossa Senhora) do Livramento, to the English Burial Ground and to Máto-pórcos (Morro do Livramento is north of Mátopórco, northwest of Morro do Castello).
1081 - 1083, 27 Sept. 1825, on the Castello Hill in the Town of Rio de Janeiro (S 22° 54', W 43° 11', the first settlement in Rio and the zero point of longitude on old Brazilian maps, later removed for fill to extend the city into the bay).
1084 - 1103, 29 Sept. 1825, In Botafogo Bay (S 20° 57', W 43° 11').

He next took a short trip up through the state of Rio de Janeiro to Minas Gerais from 7 October to 16 November 1825,collecting numbers 1105-1 to 1105-123.
1105-1 - 1105-7, 7 Oct. 1825, Pôrto de Estrella (S 22° 44', W 43° 14', by mouth of Rio Estrella or Inhomerim) - lichens.
1105-8, 8 Oct. 1825, Tamaratí (Itamariti, a fazenda at Petropolis, S 22° 32', W 43° 11').
1105-9 - 1105-25, 19 Oct. 1825, Descoberto do Rio Novo.
1105-26, 3 Nov. 1825, At Francisco Manoel's.
1105-27 - 1105-35, 6 Nov. 1825, at Capt. Amaro Leite's.
1105-36 - 1105-37, 8 Nov. 1825, between Pillão and the Regístro, Pôrto do Mar, on the Parahiba (probably Entre Rios, now Tres Rios, S 22° 6', W 43° 12').
1105-38 - 1105-44, 9 Nov. 1825, between the Parahiba Regístro and Morro Grande (going east on the Parahiba and then south on the Paquequer to Cármo which may be Morro Grande, as it is on a hill, S 21° 55', W 42° 37').
1105-45 - 1105-51, 10 Nov. 1825, between Morro Grande and Soumidouro (Sumidouro, S 22° 03', W 42° 42', on his way back to Rio)
1105-52 - 1105-57, Between Soumidouro and Tamaratí (the fazenda at Petrópolis, S 22° 32', W 43° 11').
1105-58 - 1105-74, 12 Nov. 1825, between Corrego Secco (another fazenda at Petrópolis), Serra d'Estrella, and Mandióca; on the summit of Serra d'Estrella (Alto da Serra? Inhomerim?).
1105-75 - 1105-82, 13 Nov. 1825, at Mandióca (Raiz da Serra? Piabetá? S 22° 34, W 43° 10').
1105-83 - 1105-107, 27. Oct to 14 Nov. 1825, in the Province of Minas Gerais on the road between Porto d'Estrella and the Descoberto do Rio Novo. (The repetition of these dates and places indicates that these plants may have been numbered late).
1105-108 - 1105-123, 15 Nov. 1825, on the Ilha do Governador (in Guanabara Bay, S 22° 47-50', W 43° 10-15'. This completes the 1105 series).

The numbers 1106 - 3040 conclude the Rio de Janeiro and

vicinity collections.

1106 - 1152, 6 Dec. 1825, on the Corcovado Mountain, on the summit and in the forest which clothes the highest part of the mountain (S 22° 57', W 43° 13').

1153 - 1180, Along the more open part of the road, from the forests to the head of the Aqueduct.

1181 - 1192, Along the upper end of the Aqueduct as far as the spot where the road crosses it to the northern side, and where the collection of 15.9.25 ended.

1193 - 1250, 19 Dec. 1825, along the Aqueduct as on 8 Sept., no. 819.

1251 - 1273, 24 Dec. 1825, along the Aqueduct mostly on the left or SE side and the thick woods.

1274 - 1283, (Same day, on the same hill) quitting the aqueduct by the first opening or valley just above the stone quarry.

1284 - 1291, (Same day) above the stone quarry.

1292 - 1371, 29 Dec. 1825, Barros Vermelhos and Rio Comprido (S 22° 55-56', W 43° 12').

1372 - 1461, 31 Dec. 1825, on the Corcovado Mountain by the way of Laranjeiras.

1462 - 1487, 1 Jan. 1826, about Catete, near the bridge and Praia do Flamengo (both places S 22° 55-56', W 43° 10').

1488 - 1564, 10 Jan. 1826, in a walk from Praia Grande (Nictheroy or Niteroi, S 22° 53', W 43° 08') to the village of São João do Carahy (Icarai, part of Niteroi, S 22° 55', W 43° 08') and two miles farther.

1565 - 1655, 18 Jan. 1826, in a walk to the village of São Christovão (section of Rio where the Museu Nacional is located, S 22° 54', W 43° 13') and Engenho Velho.

1656 - 1664, 22 Jan. 1826, at Catete (S 22° 55-56', W 43° 10') near the bridge.

1665 - 1668, 26 Jan. 1826, Barros Vermelhos.

1669 - 1718, 26 Jan. 1826, Morro da Ladira.

1719 - 1731, Catombi (Catumbi, east side of Morro Santos Rodrigues).

1732 - 1862, Along the Valley of Catumbi 1732 - 1760 Aqueduct 1761 - 1812 and ascent of high mountain on the NW side and along the aqueduct 1854 - 1862.

1863 - 1922, At Frechal, Frexal, or Frechaes (S. Aleixo? S 22° 33', W 43° 04') between Majé (Magé S 22° 39', W 43° 02') and the Organ Mountains (southeast of Petrópolis).

1923 - 1996, Serra dos Orgãos about the head of River Paquequé (Paquequer), near Mr. March's dwelling house (near Teresópolis, S 22° 26', W 42° 59').

1997 - 2004, 8 Feb. 1826, northward to the Mule and Cow Currals - to the Horse Curral and Milho Roca (probably on Mr. March's property).

2005 - 2140, 11 Feb. 1826, mountain in front of Mr. March's house.

2141 - 2158, 9 Feb. 1826, River Pacaqué by Mr. March's house.

2159-2213, 13 Feb. 1826, (Same location).

2214 - 2366, 15 Feb. 1826, 1 1/2 miles south of Mr. March's

house.
2367 - 2441, 20 Feb. 1826, River Pacaqué near Mr. March's house.
2442 - 2488, 21 Feb. 1826, 1 1/2 miles north of Fazenda de Pacaqué - March's.
2489 - 2506, (Same date and place) along road.
2507 - 2575, Forest, descent from Serra dos Orgãos to Frechal (S. Aleixo? S 22° 33', W 43° 04').
2576 - 2584, Foot of mountains to Frechal.
2585 - 2704, 25 Feb. 1826, Frechal to Magé (S 22° 39', W 43° 02').
2705 - 2735, 28 Feb. 1826, two miles down Rio Magé from Magé, from canoe.
2736 - 2743, 27 Feb. 1826, Town of Magé.
2744 - 2777, 1 Mar. 1826, up Rio Magé to Fazenda da Lagôa.
2778 - 2829, 22 Mar. 1826, along Aqueduct nearly to head of Valley of Laranjeiras (back in Rio, S 22° 56', W 43° 11-12').
2830 - 2832, 27 Mar. 1826, Village of São Domingos (part of Niteroi, S 22° 53', W 43° 08').
2833 - 2917, (Same date), to the Island of Boa Viagem (part of Niteroi, S 22° 55', W 43° 08').
2918 - 2935, 31 Mar., 11 June 1826, Catete (S 22° 55-56', W 43° 10') and the suburbs of Rio.
2936 - 2976, 10 June 1826, Valley of Laranjeiras.
2977 - 3006, Catete and suburbs of Rio.
3007 - 3028, 17 Aug. 1826, Tejuca (Tijuca) Mountains (S 22° 56', W 43° 16').
3029 - 3040, 20 Aug. 1826, between Catete and Botafogo Bay.

Mr. Burchell goes to the area of Santos where finishes his first bound volume with numbers 3041 - 3464.
3041 - 3082, 16 Sept. 1826, in the forest close above the Benedictine Monastery at Santos (S 23° 57', W 46° 19').
3083 - 3108, 20 Sept. 1826, same.
3109 - 3152, 24 Sept. 1826, swampy level ground westward of Santos towards Cubatão (S 23° 53', W 46° 25').
3153 - 3182, 26 Sept. 1826, to Chapel of Nossa Senhora de Montserrat.
3183 - 3204, 29 Sept. 1826, at Santos in the woods.
3205 - 3226, 1 Oct. 1826, at the Barra along the shore of the Bay, thence through swampy woods back to the Town of Santos.
3227 - 3261, 18 Oct. 1826, Outeirinhos (a "small elevation of land on the left bank of the River Iguape in front of Morro Jupuvura" S 24° 40', W 47° 37', translated from Dicionario Geografico do Estado de São Paulo by Gastao Cesar Bierrenbach Lima, São Paulo, 1943) to Santos.
3262 - 3312, 22, 23 Oct. 1826, Santos to São Vicente (S 23° 58', W 46° 23').
3313 - 3361, 25 Oct. 1826, in the forest under the Mountain etc.
(3365)
3366 - 3386, 3 Nov. 1826, on Montserrat (in Santos on north-

east part of Island of São Vicente).
3387 - 3411, 9-11 Nov. 1826, near the Benedictine Monastery in the chacara where I resided (in Santos).
3412 - 3439, 12 Nov. 1826, forest above Benedictine Monastery.
3440 - 3450, 16 Nov. 1826, (same locality).
3451 - 3461, 1 Dec. 1826, (same locality).
3462 - 3464, 2 Dec. 1826, (same locality).

End of Bound Volume I

In Bound Volume II, with numbers 3462 - 5336, Mr. Burchell finishes in Santos and collects in São Paulo and its vicinity and starts north in São Paulo toward Minas Gerais.
3462 - 3483, 8 Dec. 1826, near Cubatão (S 23° 53', W 46° 25') at Rio das Pedras (S 23° 52', W 46° 28') in Mr. Smith's Citio and immediate vicinity.
3484 - 3514, 9 Dec. 1826, same, in sylvis.
3515 - 3544, 10 Dec. 1826, same.
3545 - 3594, 13 Dec. 1826, in the lower part, about 1/3, of the Ascent up the Serra de Cubatão (S 23° 51', W 46° 28').
3595 - 3628, 15 Dec. 1826, at Rio das Pedras.
3629 - 3679, 16 Dec. 1826, in the middlepart, about 2/3, of the Ascent up the Serra de Cubatão.
3680 - 3725, 22 Dec. 1826, in the upper part of the Ascent up the Serra de Cubatão - summit or Pico da Serra.
3726 - 3823, 22 Dec. 1826, from the Pico da Serra, 1 1/2 miles toward São Paulo.
3824 - 3864, 24 Dec. 1826, 15 Jan. 1827, about Rio das Pedras and Cubatão.
3865 - 3885, 17 Jan. 1827, summit of Serra de Cubatão to the village of São Bernardo (S 23° 42', W 46° 33').
3886 - 3984, 18 Jan. 1827, about the village of São Bernardo.
3985 - 4080, 20 Jan. 1827, São Bernardo to São Paulo (S 23° 33', W 46° 38').
4080-2 - 4080-10, Jan. 1827, São Paulo.
4081 - 4153, 3 Feb. 1827, São Paulo, about 1 m. NW by N from the Tanque de Zunica as far as the Caveira Santa, in the level dry shrubby campos.
4154 - 4209, 10 Feb. 1827, at St. Paul's for about 2 miles along the Rio de Janeiro road.
4210 - 4278, 15 Feb. 1827, along the road from the Tanque de Zunica to the Convento da Luz (in the northern part of the city, abit east of the center) and thence along the Sta. Anna road (goes due north from São Paulo) over the River Tieté (runswest across the northern part of São Paulo, the crossing at Sta. Anna is S 23°31', W 46° 40') to a few huts which are about 3 miles distant from my own house.
4278-2 - 4278-8, 4279 - 4290, 21 Feb. 1827, vicinity of St. Paul's for about a mile, along the S. Amaro road.
4291 - 4315 (4319), 22 Feb. 1827, St. Paul's - northward 2 miles towards Agoa-Branca (Agua Branca).
4320 - 4384, 4 Mar. 1827, at Morumbe (Marumbí is the district on the outskirts of modern São Paulo where a great new football

stadium and buildings for other sports are located), over the hilly pastures east of the House. (Northwest part of city now).

4385 - 4403, 6 Mar. 1827, Morumbe Road NNW.
4404 - 4437, 7 Mar. 1827, Morumbe, to the Porto SSE.
4438 - 4452, 7 Mar. 1827, Morumbe, walk to the Porto.
4453 - 4474, 9 Mar. 1827, Morumbe, valley southward.
4475 - 4512, 10 Mar. 1827, Morumbe, near the house.
4513 - 4549, 12 Mar. 1827, Morumbe, walk to Old House.
4550 - 4588, 14 Mar. 1827, Morumbe, to the Flint Hill and thence to the Iron Stone Hill.
4589 - 4626, 16 Mar. 1827, Morumbe to São Paulo - to Rio dos Pinheiros 4589 - 4616 (a river starting in the southwest of the city, flowing north to the Tieté).
4627 - 4681, 4681-1 - 4681-63, 4682 - 4683, 24 Mar. 1827, Praça da Alegria, by Aroucheis, west towards Agua Branca about 2 m from Tanque de Zunica.
4684 - 4705, 4705-1 - 4705-17, 4706 - 4712, 1 Apr. 1827, S. Paulo - Santos Road as far as church de Nossa Senhora da Gloria.
4713 - 4721, 11 Apr. 1827, Varge do Carmo by Rio Road.
4722 - 4728, Same, campo.
4729 - 4736, 25 Apr. 1827, Same.
4737 - 4744, 3 May 1827, Same.
4745, Tanque de Zunica.
4746 - 4749, 9 May 1827, Tanque de Zunica to the Luz Convent (Northern São Paulo, a bit east of the center of the city).
4750 - 4765, 10 May 1827, Tieté to Sta. Anna (S 23° 31', W 46° 40').
4766 - 4766-2, 11 May 1827, "Boa Morte" in ripa rivuli Tamandaty (Tamandatei, a river which goes north northwest through the city into the Tieté - it later became a canal).
4767, 29 May 1827, Ponte do Marchál.
4768, 6 June 1827, "Caveira Santa".
4769 - 4769-3, S. Paulo.
4770 - 4774, 17 June 1827, Praça da Alegria.
4775 - 4776, 18 June 1827, Horto Arouchs (Aroucheis?).
4777, 23 June 1827, Ad Jaraguá (a town and a mountain northwest of São Paulo, S 23° 27', W 46° 45').
4778 - 4779, 10 July 1827, Morumbe.
4780 - 4781, 19 July 1827, Tanque do Carvalho.
4782 - 4785, 25 July 1827, Rio Tieté at Ponte do Coronel Anastacio.

This is the start of further travels north through São Paulo State, Minas Gerais, and Goiás to Belém do Pará.

4786 - 4826, 26 July 1827, Rio Tieté at Ponte do Coronél Anastácio.
4827 - 4836-3, 27 July 1827, between the Rio Tieté and the Rio Juquirí.
4837 - 4842, 27 July 1827, Juquirý, house of Francisco da Paula da Silva e Horta (S 23° 21', W 46° 44').
4843 - 4853, 29 July 1827, Juquirý to the Rancho do Felis.
4854 - 4868, 29 July 1827, Rancho do Felis.

4869 - 4885, 30 July 1827, Rancho do Felis to Jundiahý (S 23° 11', W 46° 53').
4886 - 4916, 31 July 1827, Jundiahý campestris.
4917 - 4923, 1 Aug. 1827, Jundiahý to Rio Capivarý (S 23° 03', 46° 57').
4924 - 4933, 1 Aug. 1827, at Rio Capivarý.
4934 - 4957, 2 Aug. 1827, Rio Capivarý to town of Campinas or S. Carlos (S 22° 53', W 47° 05'), the country entirely thick forest and hilly.
4958 - 4971, 3-6 Aug. 1827, Campinas, woods east of rancho.
4972 - 4997, 8 Aug. 1827, same, dry stunted shrubby hill southwest of town.
4998 - 5019, 9 Aug. 1827, Campinas to Fazenda Bucaiúva. Country entirely forest; and soil a red-brown strong clay.
5020 - 5040, 10 Aug. 1827, Bucaiúva to Restinga.
5041 - 5067, Bucaiúva to Restinga, forest.
5068 - 5072, Restinga.
5073 - 5104, 11 Aug. 1827, Restinga to Mógi-Merím (S 22° 26', W 46° 57').
5105 - 5183, 15 Aug. 1827, Mógi-Merím, campestris, sylva.
5184 - 5196, 19 Aug. 1827, Mógi-Merím to Örisánga (Rio Oriçánga, S 22° 12', W 46° 57').
5197 - 5208, 20 Aug. 1827, Örisánga.
5209 - 5242, 20 Aug. 1827, Örisánga to Itupéva (Rio Itupéva, S 22° 05', W 46° 59").
5243 - 5280, 21 Aug. 1827, Itupeva to Cocaes (S 21° 50', W 47° 02').
5281 - 5325, 22 Aug. 1827, Cocaes to Tambaú (S 21° 42', W 47° 16').
5326 - 5336, 23 Aug. 1827, Tambaú to Cercado (Cerrado? S 21° 33', W 47° 27').

End of Bound Volume II

Bound Volume III continues with numbers 5337 to 6817 and takes Mr. Burchell as far as the city of Goyáz (Goiás).
5337 - 5345, 24 Aug. 1827, Ollaría (Gloria?. S 21° 34', W 47° 23').
5346 - 5355, 25 Aug. 1827, Ollaría to Rio Pardo (S 21° 28', W 47° 21').
5356 - 5382, 26 Aug. 1827, Rio Pardo to Cubatão (where Rio Pardo crosses the Rio Cubatão (S 21° 25', W 47° 23').
5383 - 5408, 27 Aug. 1827, Cubatão to Retiro.
5409 - 5419, Retiro.
5420 - 5435, 28 Aug. 1827, Retiro to Servo
5436 - 5440, 29 Aug. 1827, Servo.
5441 - 5455, 29 Aug. 1827, Servo to Ribeirão de Paciencia (S 20° 50', W 47° 25').
5456 - 5461, Rio de Paciencia.
5462 - 5487, 30 Aug. 1827, Rio de Paciencia to Ribeirão de Veravinha.
5488 - 5497, 31 Aug. 1827, R. Veravinha.
5498 - 5524, 1 Sept. 1827, R. Veravinha to Villa Franca (S 20°

32', W 47 24').
5525 - 5551, 5 Sept. 1827, Villa Franca to Cachoeira.
5552 - 5562, 6 Sept. 1827, Cachoeira.
5563 - 5582, 6 Sept. 1827, Cachoeira to Fazenda Burití (Buritys, S 20 13', W 47 44').
5583 - 5617, 7 Sept. 1827, Burití to Retiro.
5618 - 5632, 8 Sept. 1827, Retiro to Rio Grande at Pôrto Alto (Ponte Alta, S 19° 59', W 47° 46').

MINAS GERAIS

5633 - 5646, 9 Sept. 1827, Rio Grande to Retiro de Tenente.
5647 - 5665, 9 Sept. 1827, Retiro do Tenente.
5666 - 5691, 10 Sept. 1827, Retiro do Tenente to Farinha Podre (Uberaba, S 19° 45', W 47° 55').
5692 - 5702, 11 Sept. 1827, Farinha Podre.
5703 - 5719, 11 Sept. 1827, Farinha Podre to Lanhoso.
5720 - 5752, 12 Sept. 1827, Lanhoso to Tejuco (Rio Tejuco, Rib. Agua Limpa, S 19° 35', W ca. 48°).
5753 - 5789, 13 Sept. 1827, Tejuco to Verába-legitima.
5790 - 5836, 14 Sept. 1827, Veráva-legitima to Rio das Velhas (S 19° 05', W ca. 47° 55').
5837 - 5859, 15 Sept. 1827, Rio das Velhas to Furnas (Indianópolis, S 19° 03', W 47° 55').
5860 - 5880, 17 Sept. 1827, Furnas to Pisarão (Cascalho Rico, S 18° 34', W 47° 52').
5881 - 5907, 19 Sept. 1827, Pisarão to São Domingos.
5908 - 5913, 20 Sept. 1827, São Domingos to Rio Paranaíba and Borda do Matto (Borda da Mata on the Rio Paranaíba at S 18° 28', W 47° 55').
5913 - 5931, Same in sylva densa antiquissima.

GOIÁS

5932 - 5934, 22 Sept. 1827, Borda do Matto to Riácho (AGS: S 18° 10', W 47° 58').
5935 - 5954, Riácho to Catalão (S 18° 10', W 47° 57').
5955 - 5974, 24 Sept. 1827, Arraial de Catalão to the Pé-do-mórro.
5975 - 6007, 25 Sept. 1827, Pé do Mórro to Rio Verissimo (S 17° 58', W 48° 10').
6008 - 6015, 26 Sept. 1827, Rio Verissimo to Braço do Rio Verissimo (S 17° 52', W 48° 06').
6016 - 6019, 27 Sept. 1827, Rio Braço do Verissimo to Láges (Corrego da Lajes, S 17° 35', W 48° 07').
6020 - 6036, 28 Sept. 1827, Láges to Palmitál (Ribeiro Palmitál, S 17° 29', W 48° 13').
6037 - 6044, 29 Sept. 1827, Palmitál to Pé da Rocha.
6045 - 6061, 30 Sept. 1827, Pé-da-Rocha to Rio Corumba (S 17° 26, W 48° 19').
6062 - 6072, 2 Oct. 1827, Rio Corumba to Brejo.
6073 - 6077, 3 Oct. 1827, Brejo to Baú, the Engenho of Miguel

Ribeiro (The Enciclopédia dos Municipios lists a small stream named Baú near Pires do Rio, S 17° 18', W 48° 18').

6078 - 6090, 4 Oct. 1827, Baú to Campo Aberto (Alegre? On the 1940 American Geographical Society map there is a Campo Alegre just northeast of Pires do Rio at S 17° 13, W 48° 17', which is not the larger Campo Alegre de Goiás further east).

6091 - 6110, 5 Oct. 1827, Campo Aberto or Campo Alegre? to S. Basil or S. Basio.

6111 - 6121, 6 Oct. 1827, Vasio (Basio?).

6122 - 6158, Vasio to Bomfim, partly woody campo, partly open.

6159 - 6162, 7 Oct. 1827, Bomfim (Silvânia, S 16° 40', W 48° 36').

6163 - 6170, 8 Oct. 1827, Bomfim to Rio Piracanjuba (S 16° 33' W 48° 50').

6171 - 6196, 9 Oct. 1827, Piracanjuba to As Ántas (Anápolis, S 16° 20', W 48° 58'), P. Borge's.

6197 - 6209, 10 Oct. 1827, As Ántas to Forquilho.

6210 - 6232, 11 Oct. 1827, Forquilha to Forna (Fazenda de Furnas? AGS: S 15° 58', W 48° 56').

6233 - 6241, 12 Oct. 1827, Forna.

6242 - 6252, 12 Oct. 1827, Forna to Méia Pónte (Pirenópolis, S 15° 52', W 48° 58').

6253, 15 Oct.; 6254 - 6281, 16 Oct.; 6282,- 19 Oct.; 6283 - 6287, 20 Oct.; 6288, 22 Oct. 1827, Méia Pónte.

6289 - 6326, 23 Oct. 1827, Méia Pónte to Caïsára (There is a Corrego de Cahyssara west and a little south of Pirenópolis).

6327 - 6334, 24 Oct. 1827, Caïsára to São Joaquím.

6335 - 6353, 25, 26, 27 Oct. 1827, São Joaquím.

6354 - 6358, 28 Oct. 1827, São Joaquím to Sapezál.

6359 - 6362, 29 Oct. 1827, Sapezál in the forest called Matto Grosso (S 15° 53', W 49° 18').

6363 - 6370, 29 Oct. 1827, Sapezal to Retiro (Corrego do Retiro (AGS: S 15° 53', W 49° 37').

6371 - 6386, 30 Oct. 1827, Retiro to Conceição.

6387 - 6411, 31 Oct. 1827, Conceição to Campo Alegre (Ribeirão Alegre, AGS: S 15° 55', W 49° 54').

6412 - 6437, 1 Nov. 1827, Campo Alegre to Urú (Rio Urú, S 15° 54', W 49° 58').

6438 - 6450, 2 Nov. 1827, Urú to Cidade de Goyáz (Goias, S 15° 56', W 50° 08').

6451 - 6541, 9 Jan. 1828, Goyáz.

6542 - 6556, 18 Jan. 1828, Goyáz, high ground at S. Eastern entrance.

6557 - 6572, Goyáz, in woods along the Rio Manuel Nunes.

6573 - 6609, 28 Jan. 1828, Goyáz, 1 m. along road to Arráial do Ferreiro (AGS: S 15° 52', W 50° 04').

6610 - 6631, 5 Feb. 1828, Goyáz, left bank of Rio Vermelho from the Rio de Manoel Gomes to the Carioca fountain (The Rio Vermelho comes from the northeast into Goyáz and flows out toward the northwest).

6632 - 6700, 11 Feb. 1828, road to Cuyaba as far as the Rio Bagagem (Ribeiro Bagagem flows due south from Goyáz).

6700-2 - 6700-18, 17 Feb.. 1828, Goyáz, along the first 3 leagues of the road to Aldeia de S. Joze.
6701 - 6747, 21 Feb. 1828, Goyáz, from the Forca WSW about 2 m., Caminho de Nene; country uneven and entirely wooded.
6748 - 6751, 13 Mar. 1828, same.
6752 - 6755, 21 Mar. 1828, same.
6756 - 6817, 23 Mar. 1828, Caminho de Nene, Sitio of Zacharia Ferreira to City.

This completes Volume III of Mr. Burchell's Brazilian Catalogue. We continue the trip through Goiás to Pará and Belém with numbers and places listed in his Large Field Book. There are no dates listed but in a "Memoranda Botanica" manuscript, Mr. Burchell states that "The Brazilian Herbarium (including those of Portugal, Madeira, and Teneriffe) collected between 25 March 1825 (arrival at Lisbon) and the 10th of February 1830 (sailing from Pará) was begun to be unpacked at Fulham on 3rd February 1847 and ended on 15 Feb 1850." This indicates that these later numbers were collected between the last date listed in the Catalogue, 23 March 1828, and 10 February 1830.

The numbers in the Field Book start with 6818 which immediately follows 6817, the last number in Volume III of the Catalogue. There is only one number before each locality. We are figuring that each of these numbers begins a series which ends with the number just before the number of the following entry.

6818 - , (Goyáz, S 15° 56', W 50° 08'), Caminho de Bacopary.
6927 - , (Goyáz), Caminho de Carreira.
6995 - , (Goyáz), Morro de Canta Gallo.
7063 - , (Goyáz), no entry.
7070 - , (Goyáz), peak near Canto Gallo.
7159 - , (Goyáz), suburbanae.
7164 - , (Goyáz), Rio Bacalhão.
7213 - , (Goyáz), Rio de Manoel Gomés.
7289 - , (Goyáz), suburbanae.
7310 - , (Goyáz), Chapel of S. Amaro.
7341 - , (Goyáz), suburbanae.

Resumption of northward travel from Goiás toward Belém.
7353 - , Urú - Rio das Pedras (Rio Urú goes west from Goiás, S 16°, W 50°, and then northwest to Ribeiro das Pedras (AGS: S 15° 45', W 49° 55').
7367 - , Road to Retiro (Corrego do Retiro, AGS: S 15° 55', W 49° 35').
7389 - , Retiro.
7397 - , Retiro to Goiabeira.
7411 - , Goiabeira.
7436 - , Goiabeira to Corrego de Jeraguá (Jaraguá - there is a Serra de Jaraguá and a city of Jaraguá nearby at S 15° 45', W 49° 20' but we could not find a stream or corrego).
7449 - , Corrego de Jeraguá to Rio Bonafacio.
7463 - , Rio Bonafacio to Estiva (there is a Ribeirão da Estiva just east of Matto Grosso de Goiás at AGS: S 15° 50', W 49°

26', but he would be retracing his steps).
7486 - , Estiva to Capão de S. João (Morro de S. João? AGS: S 15° 45', W 49°).
7498 - , Capão de S. João to Ribeirão dos Macácos (Rio dos Macácos, S 15° 45', W 48° 21').
7503 - , Ribeirão dos Macácos to Olhos de Agoa (Olhos de Agua, ca. 16 - just above on AGS map and just below on Inst. Bras. map, W 48° 45' on AGS map and 48° 36' on Inst. Bras. map. In this move he retraces his steps also).
7526 - , Olhos de Agoa to Bom Jesús.
7542 - , Bom Jesús to Fazenda Seca (Corrego da Fazenda Seca is due north of Olhos de Agua running from S 15° 10', W 48° 45' to S 15°, W 48° 50').
7558 - , Fazenda Seca to Rio Maranhão (S 14° 59', W 48° 45').
7567 - , Rio Maranhão.
7574 - , Rio Maranhão to Guardamôr.
7580 - , Guardamôr to Ribeirão de S. João.
7601 - , Ribeirão de S. João to Ribeirão da Vendinha (Corrego Vendinha, just south of Trahiras).
7613 - , Ribeirão da Vendinha to Trahiras (Trairas, Tupiracaba S 14° 30', W 48° 34').
7624 - , Trahiras to S. Joze (S. José de Tocantins, Niquelandia, S 14° 28', W 48° 27').
7631 - , no locality listed.
7647 - , S. Joze to R. Bagagem (S 14° 22', W 48° 14').
7681 - , Rio Bagage to Rio da Serra (S 14° 21', W 48° 10').
7719 - , Rio da Serra to Rio Tucantíns (Rio Tocantinzinho, S 14° 17', W 48°).
7747 - , Rio Tucantíns to Ribeirão Padre.
7762 - , Ribeirão Padre to Rio Preto (The Preto goes from east of 48° W longitude northwest to join the Rio Maranhão at about S 13° 37', W 48° 07'. We think Mr. Burchell met it at about S 14° 08', W 47° 55').
7790 - , Rio Preto to As Lages (There is a Lajes on the Inst. Bras. map at S 14° 03', W 48° 08' which would mean that he retraced his steps to the westward).
7821 - , As Lajes to Rio Moquém (The only Rio Moquém is a Ribeirão back south at AGS: S 14° 30', W 48° 08' near the town of Moquém (Muquém) of the same latitude and W 48° 10' longitude. This would mean that he further retraced his steps. There is some question as to whether he did this, whether similar place names further northeast are lost, or whether he got his numbers mixed up and made these stops on the original trek northeast).
7860 - , Rio Moquém to As Aráras (There is a Ribeirão das Areias at AGS: S 14° 17', W 48° 09' which is between Moquem and Cavalcante and might be this reference).
7876 - , As Aráras to Cavalcánte (S 13° 47', W 47° 30').
7897 - , Cavalcánte.
7923 - , Cavalcánte to Ribeirão Gambá.
7944 - , Ribeirão Gambá to Rio dos Bois (S 13° 34', W 47° 16') Sobrado.
7957 - , Rio dos Bois to Rio Paranán (Rio Paraná, S 13° 27',

W 47 16').
7986 - , Rio Paranán to Taláya (Riaucho Atalaia, AGS: S 13° 30'-25', W 46° 53').
7991 - , Talaya to Rio Bezérra (S 13° 03', W 46° 57').
7996 - , Rio Bezérra to Rio Chupetéiro.
8017 - , Rio Chupetéiro to Arráyas (Arraias, S 12° 56', W 46° 56').
8036 - , Arráyas to Corrego Rico.
8075 - , Corrego Rico to Sapé (Sapeteiro? AGS: S 12° 53', W 46° 53').
8104 - , Sapé to Sta. Brizida (Serra Sta. Brigida? S 12° 42', W 46° 57').
8121 - , Sta. Brizida to Rio Pálma (S 12° 28', W 47° 08').
8133 - , Rio Pálma to Conceição (Conceição do Norte, S 12° 14' W 47° 16').
8146 - , Conceição.
8156 - , Conceição to Boracão.
8169 - , Boracão to S. Bento (AGS: S 12° 05', W 47° 07').
8177 - , S. Bento to Rio Cangálho (Ribeirão Cangalha, S 11° 53' - 12°, W 47° 27').
8199 - , Rio Cangálho to Rio Manoel Alves (S 11° 40-54', W 47°-48°, he probably crossed it at S 11° 53', W 47° 37').
8207 - , Rio Manoel Alves to Rio Salóbre (S 11° 44', W 47° 43').
8226 - , Rio Salóbre to Natividade (S 11° 42', W 47° 47').
8251 - , Natividade to Chapada (S 11° 37', W 47° 52').
8267 - , Chapada to Rio das Pedras (AGS: S 11° 25', W 47° 45')
8280 - , Rio das Pedras to Cánga.
8289 - , Cánga.
8311 - , Cánga to Cabeça do Boi (Morro Cabeça do Boi or Mauzoleo, AGS: S 10° 46', W 47° 45').
8323 - , Cabeça do Boi to Passatrés (Ribeirão Passa Tres (S 10° 56', W 48°).
8336 - , Passatrés to Corrego Raiz.
8356 - , Corrego Raiz to Cármo (Monte do Cármo, S 10° 45', W 48° 07').
8384 - , Cármo to Corrego Fúndo.
8393 - , Corrego Fúndo to Porto Real (Porto Nacional, S 10° 43', W 48° 25')..
8398 - , Porto Real to Igarapé (Igarapé is a Brazilian word for a channel between two islands or an island and the mainland).
8435 - , Porto Real, Ferry to mouth of Igarapé.
8482 - , Porto Real, about village.
8520 - , Porto Real, ford of Igarapé.
8555 - , Porto Real, west side of river.
8600 - , Porto Real, Baracão.
8637 - , Porto Real, at entrance to village.
8691 - , Porto Real, about the Mánga, etc. (Rio dos Mangues? S 10 22', W 48 26' where it meets the Tocantins).
8753 - , Porto Real, various.
8765 - , Porto do Ferreira, at Porto Real.
.....

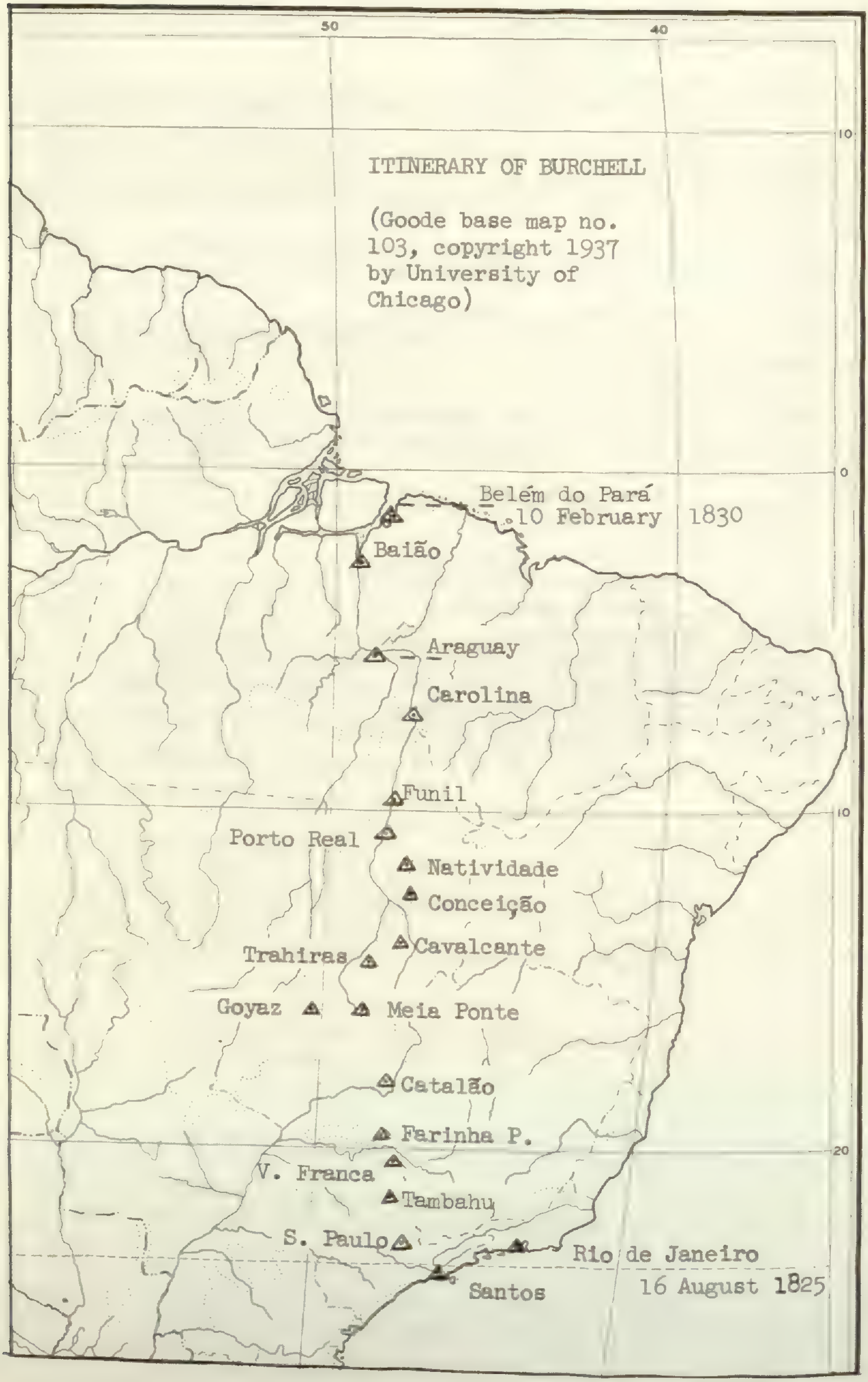
From this point on, Mr. Burchell evidently traveled on the Rio Tocantins and did much of his collecting at portages around the falls.

8788 - , Rio S. João (S 10° 25; W 48° 25 - it enters the Tocantins from the east opposite the Mangue.
8801 - , Graciosa.
8828 - , no place listed.
8841 - , Pilóens (Pilões, cachoeira or falls, S 9° 50, W 48° 20').
8847 - , Mares (Cachoeira dos Marcos? S 9° 48', W 48° 22').
8862 - , Lageado (Cachoeira Lageado and townof Lageado, S 9° 45', W 48° 22').
8864 - , Funíl (Cachoeira, S 9° 42', W 48° 22', town of Funíl and second, lower falls, S 9° 40', W 48° 24).
8888 - , no place listed.
8897 - , Red clay and slate.
8912 - , no place listed.
8915 - , Canella tree.
8921 - , Leopoldina.
8935 - , Alcântara (São Pedro de Alcântara, AGS: São Pedro, S 7° 40', W 47° 42').
8962 - , and 8965 - , no place listed.
8972 - , Sobradinha.
9015 - , Sta. Maria.
9023 - , Tres Barras (Cachoeira de I. de Tres Barras, S 6° 13', W 47° 23'. These falls would be a likely place for him to collect but they are way down river from Carolina in Maranhão, so that he either went ahead and then back or got his numbers out of order).
9026 - , Carolina (S 7 20', W 47 28') in MARANHÃO.
9079 - , no place listed.
9080 - , S. Antonio (Cachoeira, S 5° 47', W 47° 28').
9082 - , Sandy Island.

PARÁ

9092 - , Araguay (São João do Araguay or Araguaia, S 5° 24', W 48° 46').
9124 - , no place listed.
9126 - , Former Regístro (Border between Goiás and Pará).
9132 - , Large Sand Island.
9135 - , Above Itahurý (Tauiri? AGS: S 5° 07', W 49° 17' on the river).
9148 - , Anaraquarra (Cachoeira Aranaquara, AGS: S 4° 56', W 49° 22').
9165 - , Itaboca (Cachoeiras, S 4° 20-23', W 49° 23').
9213 - , Guariba (Cachoeira just above Arroio, S 3° 57', W 49° 23').
9218 - , Arroyos (AGS: Arroio, S 3° 57', W 49° 24').
9238 - , no place listed, 9241 - , no place listed.
9255 - , Praia de Espirito Santa (Ilha de Espirito Santo, AGS: S 3° 01', W 49° 27).

9259 - , Baião (S 2° 40', W 49° 40').
9275 - , no place listed.
9278 - , Sitio das Pedras.
9317 - , no place listed.
9334 - , Santa Anna (Ilha da Sta. Anna in Rio Tocantins at S 2° 30', W 49° 27').
9358 - , Rio Mojú (at the city of Mojú, S 1° 53', W 48° 46').
9378 - , no place listed.
9379 -, Porto Real to Pará (Arrival in Belém do Pará? S 1° 26', W 48° 29').
9382 - , Pará (Belém), near the house.
9429 - , Pará, za de Pao.
9452 - , Pará, east of house.
9474 - , Pará, my house to town (house must have been on outskirts of Belém).
9504 - , Pará.
9546 - , Pará, S. Joze to the arsenal (in an old map of the city of Belém, there was an arsenal on the northwest corner of the city on the bay).
9614 - , Pará, Nazareth, Rosinha near to.
9660 - , Pará, SE of S. Joze.
9718 - , Pará, south of S. Joze.
9771 - , Pará, Caminho de Chamonte.
9823 - , S. Joze de Laranjeira.
9877 - , Pará, suburban.
9908 - , Pará, Rivulet de Cerveja above the Arsenal.
9950 - , Pará, north of Campinha and Largo de Pólvora.
10032 - , Pará, mouth of the Una.
10072 - , Pará, woods SSE of S. Joze.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ITINERARY OF BURCHELL
(Goode base map no. 103, copyright 1937 by University of Chicago)
Belém do Pará
10 February 1830
Baião
Araguay
Carolina
Funil
Porto Real
Natividade
Conceição
Cavalcante
Trahiras
Goyaz
Meia Ponte
Catalão
Farinha P.
V. Franca
Tambahu
S. Paulo
Rio de Janeiro
Santos
16 August 1825

ADDITIONAL NOTES ON THE GENUS CITHAREXYLUM. V

Harold N. Moldenke

CITHAREXYLUM CHARTACEUM Moldenke

Additional bibliography: Moldenke, Phytologia 13: 284 & 304. 1966.

CITHAREXYLUM FRUTICOSUM L.

Additional bibliography: Moldenke, Phytologia 14: 433—435. 1967.

Sen & Naskar (1965) record this species as cultivated in India, but I have not as yet seen any specimens of it from that country.

CITHAREXYLUM KUNTHIANUM Moldenke

Additional bibliography: Sen & Naskar, Bull. Bot. Surv. India 7: 40. 1965; Moldenke, Phytologia 13: 295. 1966.

Sen & Naskar (1965) record this plant as cultivated in India, but I have as yet seen no actual specimens to substantiate this claim.

CITHAREXYLUM LUCIDUM Schlecht. & Cham.

Additional bibliography: Moldenke, Phytologia 13: 296. 1966.

Rzedowski refers to this plant as a shrub, 3 m. tall, and found it growing on limestone hills with Quercus and Liquidambar, at 1200 meters altitude.

Additional citations: MEXICO: San Luis Potosí: J. Rzedowski 10502 (Mi).

CITHAREXYLUM LYCIOIDES D. Don

Additional bibliography: Moldenke, Phytologia 13: 296, 311, & 316. 1966.

CITHAREXYLUM MACROPHYLLUM Poir.

Additional bibliography: Moldenke, Phytologia 13: 296—297, 302, & 314. 1966.

In addition to the comments given previously, Berti also says of this plant: "Arbol inerme, no lacticífero. Hojas simples, verticiladas de hasta 23 cm. de largo. Puntos pelúcidos ausentes. Glándulas foliares situadas en el ápice del pecíolo. Inflorescencia racimos espiciformes, axilares, verticilados. Flores zigomorfas. Corola 5-mera gamofila. Estambres 5. Cáliz gamofilo."

Additional citations: VENEZUELA: Delta Amacuro: Berti 166 (W—2458308, W—2458385).

CITHAREXYLUM MOCINNI D. Don

Additional bibliography: Moldenke, Phytologia 13: 298. 1966; Moldenke, Résumé Suppl. 14: 1. 1966.

Recent collectors describe this plant as a tree, 10—12 m. tall,

the trunk 12—20 cm. in diameter, growing as "an occasional tree" in deciduous forests with Podocarpus, Distylium, Ostrya, and Quercus or in "bosque mesófilo de encino y pino con Abies y Chiranthodendron", at altitudes of 1500—2700 meters, flowering in January and March, fruiting in March. The flowers on R. Mc Vaugh 23221 and Rzedowski & McVaugh 312 are described as "white"; the racemes on the former collection are to 42 cm. in length! Smith & Tejeda describe the fruit as orange in color; their collection, cited below, constitutes a herbarium voucher for plant samples used in the United States Department of Agriculture, Cancer Chemotherapy National Service Center, anti-tumor screening program.

Additional citations: MEXICO: Guerrero: Rzedowski & McVaugh 312 (Mi). Jalisco: R. McVaugh 23221 (Mi). Vera Cruz: Smith & Tejeda 4453 (W—2471186). HONDURAS: Morazán: Williams & Molina R. 13703 (Ws).

CITHAREXYLUM MONTANUM Moldenke

Additional bibliography: Moldenke, Mem. N. Y. Bot. Gard. 9: 176. 1955; Moldenke, Phytologia 13: 310. 1966.

CITHAREXYLUM MONTEVIDENSE (Spreng.) Moldenke

Additional bibliography: Chittenden, Roy. Hort. Soc. Dict. Gard. 1: 493. 1951; Moldenke, Phytologia 13: 298—299. 1966.

CITHAREXYLUM MYRIANTHUM Cham.

Additional bibliography: Moldenke, Phytologia 13: 299—300. 1966.

Woolston describes this plant as a tree, 6—10 m. tall, the bark gray-brown, smoothish, the flowers white, growing at the edge of woods, and called "sàrà-moroti".

Additional citations: PARAGUAY: Woolston 610 (S).

CITHAREXYLUM OLEINUM (Benth.) Moldenke

Additional synonymy: Citharexylum oleinum Moldenke, in herb.

Additional bibliography: Bocq., Rev. Verbenac. 197. 1863; Moldenke, Phytologia 13: 300—301. 1966.

Rzedowski describes the habitat of this plant as "Hab. ladera caliza con vegetación de encinar", at 1850 meters altitude; Quintero found it growing on a slope with pine-oak woods.

Additional citations: MEXICO: Hidalgo: Quintero 2856 (Mi). San Luis Potosí: J. Rzedowski 6030 (Du—513552).

CITHAREXYLUM PACHYPHYLLUM Moldenke

Additional bibliography: Moldenke, Phytologia 13: 301 (1966) and 14: 216. 1967.

CITHAREXYLUM PACHYPHYLLUM var. CANESCENS Moldenke

Bibliography: Moldenke, Phytologia 14: 216. 1967.

Citations: PERU: Ayacucho: Iltis, Iltis, Ugent, & Ugent 488

(Z--type).

CITHAREXYLUM PENTANDRUM Vent.

Additional bibliography: Bocq., Adansonia 2: 88, 123, & 130 (1862) and 3: 223. 1863; Bocq., Rev. Verbenac. 88, 123, 130, & 223. 1863; Liogier, Rhodora 67: 350. 1965; Jiménez, Supl. Cat. Fl. Doming. 1: 211. 1966; Moldenke, Phytologia 13: 287 & 301 (1966) and 14: 434. 1967.

xCITHAREXYLUM PERKINSI Moldenke

Emended synonymy: Citharexylum perkinsii Moldenke, Résumé Suppl. 10: 5, in syn. 1964; Liogier, Rhodora 67: 350. 1965.

Additional bibliography: Liogier, Rhodora 67: 350. 1965; Moldenke, Phytologia 13: 310 (1966) and 14: 431. 1967

The collectors of the three specimens cited below describe this plant as a tall shrub, 4 m. tall, with orange or bright-orange fruit [called "berries" in error by Webster & Proctor], growing in low mountain forests on jagged limestone outcrops, in montane rainforests on limestone hills, and in woods on the slopes and top of Dolphin Head in Jamaica, at altitudes of 1000—2500 feet, fruiting in July and August. Material has been misidentified and distributed in herbaria as C. caudatum L. The abundant fruits on the racemes cast some doubt on the hybrid nature of these plants, but the foliar characters are certainly intermediate between those of C. caudatum and C. spinosum L.

Additional citations: JAMAICA: Webster & Proctor 5414 (Mi); Webster, Proctor, & Powell 5358 (Mi); Webster & Wilson 5069 (Mi).

CITHAREXYLUM POEPPIGII Walp.

Additional bibliography: Bocq., Adansonia 3: [Rev. Verbenac.] 223. 1863; Moldenke, Phytologia 5: 95 (1954) and 13: 301—303. 1966.

Additional citations: VENEZUELA: Táchira: Steyermark & Rabe 96629 (Z).

CITHAREXYLUM POEPPIGII var. MARGARITACEUM Poepp. & Moldenke

Additional bibliography: Moldenke, Phytologia 5: 95 (1954) and 13: 302—303. 1966.

CITHAREXYLUM PUNCTATUM Greenm.

Emended synonymy: Aegiphila punctatum Greenm. ex Moldenke, Résumé Suppl. 12: 9, in syn. 1965; A. María, Pl. Valle Cochabamb. 2: 41. 1966.

Additional bibliography: A. María, Pl. Valle Cochabamb. 2: 41. 1966; Moldenke, Phytologia 13: 303 (1966) and 14: 435. 1967.

María (1966) cites his nos. 657/6a & 868/7a from Cochabamba, Bolivia. Cárdenas found the plant growing on rocky slopes at 3200 meters altitude.

Additional citations: BOLIVIA: Cochabamba: M. Cárdenas 6176 (W—2472185). Department undetermined: M. Bang 1917 (Ws—isotype).

CITHAREXYLUM QUERCIFOLIUM Hayek
Additional bibliography: Moldenke, Phytologia 13: 303 & 317. 1966.

CITHAREXYLUM SESSAEI D. Don
Additional bibliography: Moldenke, Phytologia 13: 312--313. 1966.

The Pringle 8969, distributed as C. sessaei, is actually the type collection of C. hidalgense Moldenke.

CITHAREXYLUM SPINOSUM L.
Additional bibliography: Bocq., Adansonia 3: [Rev. Verbenac.] 223. 1863; Lefroy, Bull. U. S. Nat. Mus. 25: 97. 1884; Achart, Quinz. Cent. Pl. Ind. 145. 1905; L. H. Bailey, Man. Cult. Pl., ed. 1, pr. 1, 631 & 807 (1924), pr. 2, 631 & 807 (1925), and pr. 3, 631 & 807. 1938; Sandw., Kew Bull. Misc. Inf. 1938: 373. 1938; L. H. Bailey, Man. Cult. Pl., ed. 1, pr. 4, 631 & 807. 1944; Chittenden, Roy. Hort. Soc. Dict. Gard. 1: 493. 1951; Moldenke, Fieldiana Bot. 28: 1083. 1957; Moldenke, Am. Midl. Nat. 59: 385. 1958; Anon., Kew Bull. Gen. Index 1929-1956, 76. 1959; Gupta & Marlange, Trav. Sect. Scient. Inst. Franç. Pond. 3 (1): 78 & 79. 1961; Srinivasan & Agarwal, Bull. Bot. Surv. India 5: 80. 1963; E. E. Lord, Shrubs & Trees Austral. Gard., rev. ed., 66. 1964; Moldenke, Résumé Suppl. 14: 5. 1966; Jiménez, Supl. Cat. Fl. Doming. 1: 212. 1966; Moldenke, Phytologia 13: 313—315 (1966) and 14: 434. 1967.
Recent collectors describe this plant as a tree, 40 feet tall, the bark rough, gray in color, the young stems square, flowering spikes drooping, and the flowers fragrant, growing in shrubby woods behind coastal beaches. The corollas are described as "white" on R. J. Wagner 578 and on Webster & Miller 9829. Material is very often misidentified and distributed in herbaria as C. fruticosum L.
Kimber reports that this species was growing with Calophyllum antillanus and Tabebuia pallida in a roadside hedge of trees forming a windbreak for sugarcane fields exposed to the trade winds on Martinique, where there was an annual rainfall of 1—2 meters, also growing in porous dark-brown earth, and as a "weed tree common on roadsides and margins of mesophytic forest" on steep east-facing ravine slopes in deep red soil with lenses of volcanic ash. The same collector found it on Dominica as a small tree in hedges on east-facing red clay slopes exposed to the trade winds.
Lord (1964) adopts the name C. quadrangulare Willd. for this plant, but says that the C. quadrangulare of Jacquin and the C. cinereum of Jacquin are C. spinosum. He points out that the leaves in this species are longer than those of C. fruticosum and have a "drawn out end". It requires protection from frost when cultivated in Australia.
Achart (1905) describes the plant as "Arbre de 20 à 60 pieds de haut, acclimaté dans l'Inde. Le bois sert à faire des instruments

de musique, d'où son nom de bois à guitare." Srinivasan & Agarwal (1963) record it from Lahore and from Ferozepur, Punjab, and West India, but whether as naturalized wild plants or cultivated is not clear.

Additional citations: PUERTO RICO: R. J. Wagner 578 (S). LEEWARD ISLANDS: Dominica: Kimber 849 (Ws). WINDWARD ISLANDS: Martinique: Kimber 524 (Ws), 1895 (Ws), 2035 (Ws). TOBAGO: Webster & Miller 9829 (S).

CITHAREXYLUM SUBFLAVESCENS Blake

Additional bibliography: Moldenke, Phytologia 13: 315--316. 1966.

Additional citations: VENEZUELA: Mérida: Bernardi 2069 (S).

CITHAREXYLUM TRISTACHYUM Turcz.

Additional bibliography: Moldenke, Inform. Mold. Set 51, 2. 1956; Liogier, Rhodora 67: 350. 1965; Moldenke, Phytologia 13: 317. 1966; Moldenke, Résumé Suppl. 14: 8. 1966.

Recent collectors describe this plant as a bush, 9 feet tall, or a tree, 15 feet tall, with black fruit in March, growing in pastures at 1700 feet altitude.

Additional citations: CUBA: Las Villas: R. A. Howard 6629 (N). Oriente: Ekman 4874 (Mi). JAMAICA: Yuncker 18324 (Mi).

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BOOK REVIEWS

Alma L. Moldenke

"An Evolutionary Survey of the Plant Kingdom" by R. F. Scagel, R. J. Bandoni, G. E. Rouse, W. B. Schofield, J. R. Stein, and T. M. C. Taylor, xi & 658 pp., illus. Wadsworth Publishing Company, Inc., Belmont, California, second printing, 1966. $11.50.

A series of successful classroom experiences in group or master teaching of a one year botany course for second-year students at the University of British Columbia, Canada, has been transformed from the ephemeral oral form to this excellent text written by the same participating teacher-specialists. The approach is holistic, yet modern and intellectually stimulating. The content is rich, full, accurate, modern, and definitely not difficult nor stuffy.

This is an educational treasure to put before a student. Terminology is quite consistent, drawings and illustrations are excellent and genuine teaching aids, and the print is clear, clean, and easy to read. The bibliography is well chosen, the glossary helpful, and the index thorough.

I wish the work on the angiosperm groups was given in as much detail as that of the lower plants. Very surprisingly the lists of vascular plant groups on the back cover separate the very similar and extremely closely related Verbenaceae and Labiatae by "several inches" into different orders!

"Flora of Texas" by Cyrus Longworth Lundell and collaborators. Volume I, xi & 407 pp., illus. Texas Research Foundation, Renner, Texas. 1966.

With this presentation volumes 1 and 3 are now completed. This volume includes monographic treatments of the Pteridophyta by D. S. Correll, Boraginaceae by I. M. Johnston, Acanthaceae by D. C. Wasshausen, Polemoniaceae by E. T. Wherry, Gymnospermae by D. S. Correll, Potamogeton by E. C. Ogden and Scleria by E. L. Core. The work is very carefully done. The many full plate drawings are very clear and well detailed.

"A Handbook of Systematic Botany" by Subhash Chandra Datta, xv & 435 pp., illus. Eastend Printers in Calcutta 14, Asia Publishing House in New York City 10019 and Taplinger Publishing Co. distributors in New York City, N. Y. 10003. 1965. $9.50.

Here is a needed, comprehensive, readable text on a topic not previously covered for the whole country of India. Following the Bentham & Hooker system, it gives compressed, basically accurate descriptions of 70 angiosperm families. Part I is an introductory development of principles and practices of taxonomy in clear-cut but old-fashioned style. Parts II and III comprise the bulk of this work analyzing the plant families called "natural orders". Obvious line drawings of pertinent floral and other characteristics clarify the text. Part IV deals with such special topics as evolution, biochemistry, etc., but not with sufficient exposure to modern studies in serology, chromosome patterns and numerical taxonomy. Part V consists of such aids to taxonomic studies as family keys à la Gray, identification of selected genera and a glossary of native plant names from 17 of the most common languages.

There is a useful appendix explaining scientific naming, a valuable reference list of "musts" for the student which hopefully the college library can provide. From them the author should have captured a presentation technique that is more interesting and challenging. The index is useful. Because of poor paper and mediocre photographic printing the central plates could better have been replaced by more drawings. The print is better than that in many Indian texts; nevertheless, theory on p. xv, Apocynaceae on plate 7 and Sansevieria on plate 14 are misspelled. The author uses "verbain" instead of the usual "vervain". Usually the keys are constructed so that students will not have major troubles following them. Only occasionally, as on p. 32, do they have to choose between "thalamus long" and "thalamus shorter" with no concrete measure as a guide.

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